TECHNOLOGY DEPARTMENT

April, 1950

THE FOUNDRY

wherever metals are cast...

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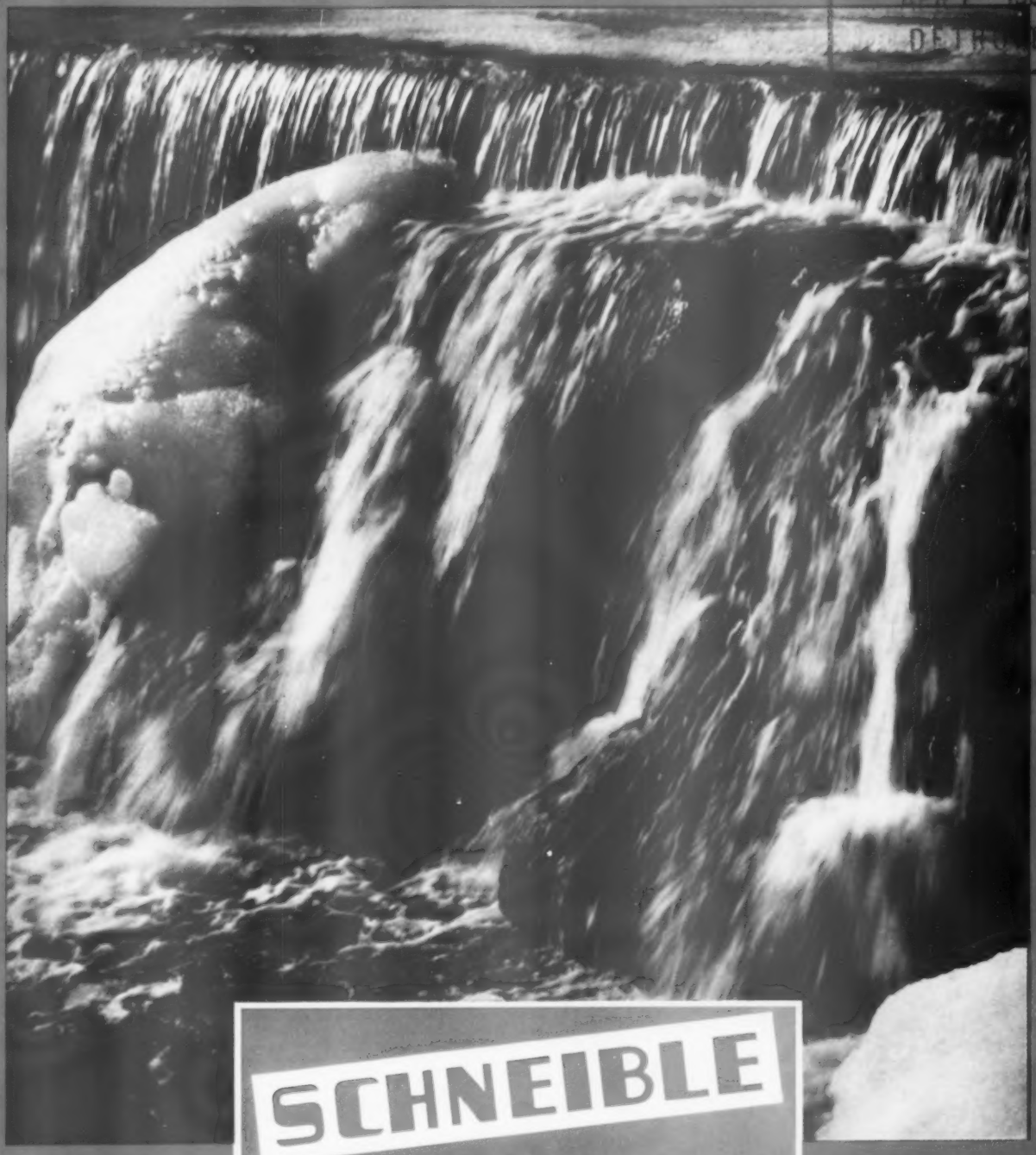

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Now bvb

SEE OUR AD PAGE 13 →

AFS Cleveland Booth No. 1103 →

WHY *PROGRESSIVE* FOUNDRIES RELY ON...

for

Better Castings

A modern cupola, holding ladle and electric bull ladle installation in Meadow Lands, Pa., plant of American Brake Shoe Co.

Purite is widely accepted as the most economical desulphurizer and cupola flux by progressive foundry operators everywhere. And here are seven good reasons why:

1. **Purite gives 100% fluxing action in the cupola — 100% desulphurizing action in the ladle.**
2. **Purite gets to the iron quicker — no faster desulphurizer made.**
3. **Purite is time-tested and proven for unsurpassed desulphurizing uniformity.**
4. **Purite comes in 2-lb. pigs — no weighing or measuring required.**
5. **Purite is 100% fused soda ash — you do not pay for inert materials.**
6. **Purite does not crumble — no waste — no dust.**
7. **Purite can be shipped in bulk carloads at substantial savings over bag shipments — is easily stored without deterioration.**

These everyday benefits show why Purite enjoys such widespread use as the foremost cupola flux and ladle desulphurizing agent. For full information, write today for literature telling how you can improve your iron with Purite. Mathieson Chemical Corporation, Mathieson Building, Baltimore 3, Maryland.

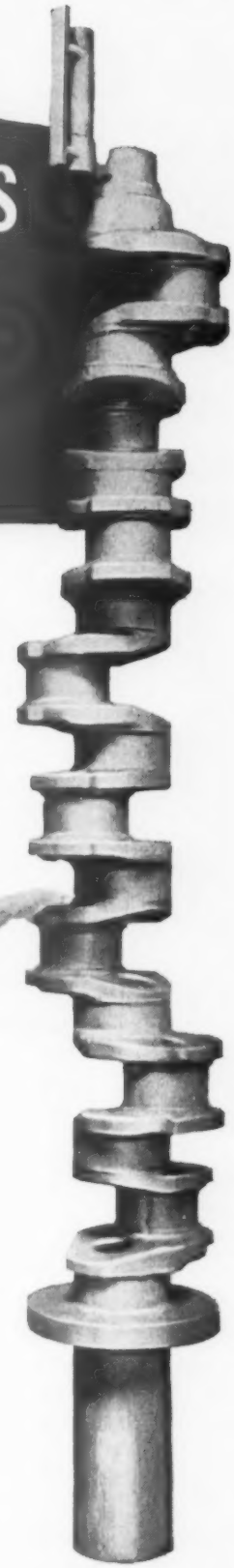
PURITE
100% FUSED SODA ASH
The Scientific Flux for Better Melting and Cleaner Iron

Purite is sold by all leading foundry supply houses in the United States and Canada.

Mathieson
CHEMICALS

SERVING INDUSTRY, AGRICULTURE AND PUBLIC HEALTH

HEAVY DUTY CRANKSHAFTS
cast in High Test
NICKEL ALLOY IRON



Crankshafts ranging from 800 to 4000 pounds in weight, and from 6 to 18 feet in length . . . for large Diesel engines in marine, locomotive, and stationary power plants . . . are now produced commercially by Pacific Car & Foundry Company's efficient new casting method.

The photograph shows an unmachined 8-throw unit that weighs 2105 pounds. It was cast in high strength nickel-molybdenum gray iron at Pacific's foundry in Renton, Washington.

This nickel alloy iron, produced as an inoculated iron in the basic electric furnace, consistently meets strength specifications of 60,000 to 75,000 p.s.i.

Each shaft is stress-relief annealed, and x-rayed to detect possible internal defects.

These nickel-molybdenum cast iron crankshafts provide:

- **Low Notch Sensitivity**
- **Excellent Vibration Damping**
- **High Resistance to Fatigue**

Avoidance of expensive dies and forging equipment, the use of cores to eliminate unnecessary metal, and the fact that castings require less machine tool time . . . point to the economy of using nickel alloy irons.

Heavy duty crankshafts indicate the wide scope of applications for high strength nickel alloy cast irons. Our casting specialists will be glad to consult with you and suggest where nickel cast irons may be useful to you. Write us today.

This high test nickel iron crankshaft is cast in a mold set horizontally, and tilted slightly while pouring. Mounted in specially designed trunions, the mold is rotated 90° to the vertical position for cooling. This provides better feeding, improved directional solidification, and thus, sound castings.

EMBLEM OF INCO SERVICE
TRADE MARK

Over the years, International Nickel has accumulated a fund of useful information on the properties, treatment, fabrication and performance of engineering alloy steels, stainless steels, cast irons, brasses, bronzes, nickel silver, cupro-nickel and other alloys containing nickel. This information is yours for the asking. Write for "List A" of available publications.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 WALL STREET
NEW YORK 5, N.Y.

SIGNS of the trend...

CROWN HILL SEACOAL FACING

POPULAR CHOICE OF FOUNDRYMEN *Everywhere*

FIGURES FROM BUREAU OF MINES DEPT. OF INTERIOR OF THE U. S.

(Moisture Free)

PROXIMATE ANALYSIS

Volatile Matter (V.C.M.)	38.9%
Fixed Carbon	57.4%
Ash	3.7%
	100.0%

ULTIMATE ANALYSIS

Hydrogen	5.4%
Carbon	82.0%
Nitrogen	1.6%
Oxygen	6.6%
Sulphur	.7%
Ash	3.7%
	100.0%

Fusion Point of Ash . . . 2980°F

Here's an 18-second summary on why most foundries use Crown Hill Seacoal Facing for venting molds.

The high volatile content (see Bureau of Mines figures) of Crown Hill means quick flash. Since the fusion point of the small ash residue is 2980° F., molten iron cannot fuse it, and low sulphur content eliminates hard spots. In short, peeling is easy and cleaning costs *come down*. Try Crown Hill, choice of most foundrymen.

SEE YOU AT THE SHOW
BOOTHS 1112 and 1116

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APRIL, 1950

THE FOUNDRY

VOLUME 78—NUMBER 4

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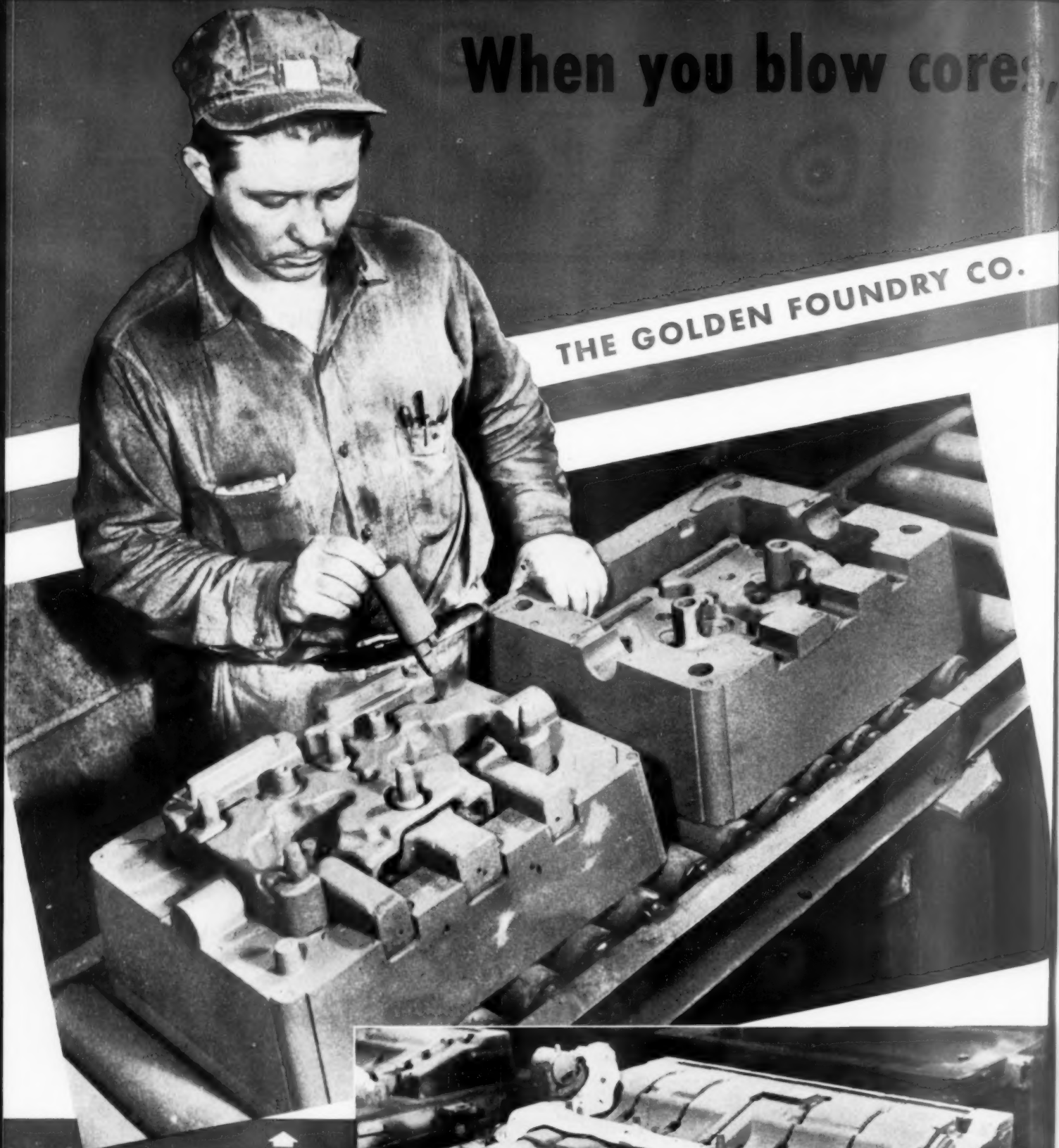
When you blow cores,

THE GOLDEN FOUNDRY CO.



Inspecting the cores in a dry-sand mold for a Model "H" head casting. 42 separate cores are required to make a complete assembly.

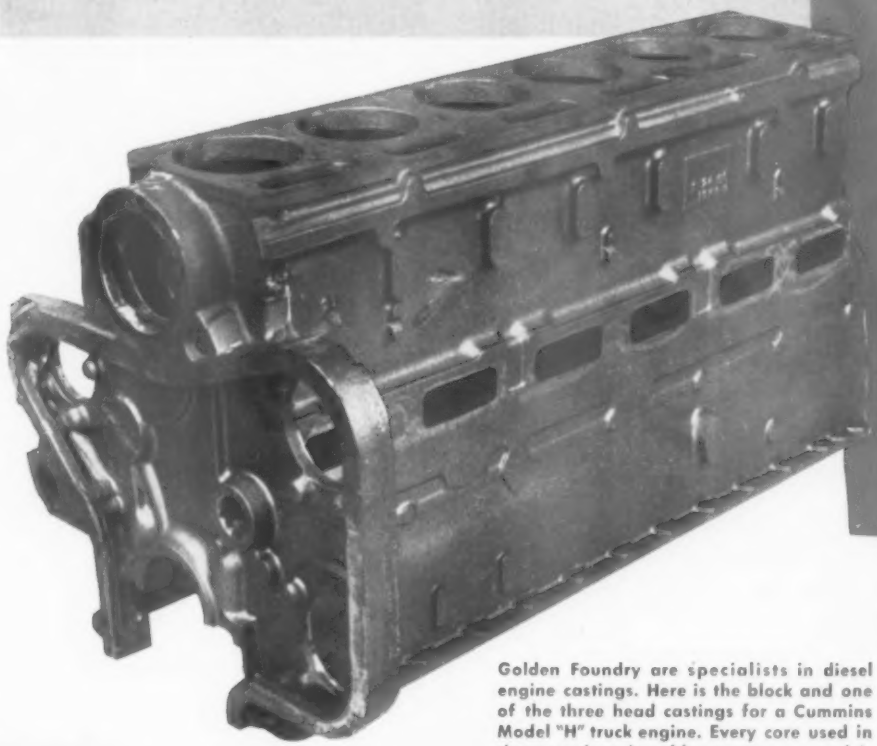
The cored drag for a Model "H" block. Each one of the twelve barrel core sections is blown right to size—eliminating rubbing during assembly.

use LINOIL for best results!

COLUMBUS, INDIANA

Core blowing is the modern way to mass-produce cores. One blower and a roll-over machine can serve several different core boxes in rotation: output is increased and labor is minimized.

A proper sand mix is one of the basic requirements for good blowing practices—and that's where LINOIL lends a hand. By taking advantage of LINOIL'S high binding strength, you can use a minimum of oil per batch of sand... avoid chances of a sticky, soggy core mix. And LINOIL demonstrates its free-working properties... the most intricate core will draw smooth and accurate, when it's LINOIL-bonded.



If you're not obtaining satisfactory results with your core-blowing, ask your LINOIL representative for his suggestions. His years of experience with various problems in many different foundries, will enable him to help you.

Golden Foundry are specialists in diesel engine castings. Here is the block and one of the three head castings for a Cummins Model "H" truck engine. Every core used in these castings is a blown core . . . and is LINOIL-bonded.

THE LINOIL THE LOGICAL OIL

THE WERNER G. SMITH COMPANY

(DIVISION OF ARCHER-DANIELS-MIDLAND COMPANY)

2191 WEST 110th STREET · CLEVELAND 2, OHIO

PANGBORN
Look
ROTOBLAST
means high-speed, low-cost blast cleaning!
ROTOBLAST cleans faster and saves you money. For example, a ROTOBLAST Barrel like this can replace as many as five old-fashioned machines, clean more castings per hour at a substantial cash saving—with virtually no breakage losses!
FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC.
MEMBER
FEMA
Pangborn
* Trademark of Pangborn Corporation

how much Pangborn ROTOBLAST* saves per month!

HERE ARE FIVE WAYS ROTOBLAST SAVES YOU MONEY

SAVES LABOR

One ROTOBLAST machine and operator can do as much as a two-man crew and old-fashioned equipment.

SAVES SPACE

In many cases, one ROTOBLAST machine replaces five or more old-fashioned machines, requires less space.

SAVES TIME

Cases on record prove ROTOBLAST can cut cleaning time up to 95.8% compared with old-style methods.

SAVES POWER

Modern ROTOBLAST uses but 15-20 h.p. compared to old-fashioned equipment requiring 120 h.p. for same job.

SAVES TOOLS

On work cleaned with ROTOBLAST, cutting tools last up to 2/3 longer because no scale is left to dull edges.

SAVINGS MEAN PROFITS

Look to Pangborn for the Latest Developments in Blast Cleaning and Dust Control Equipment

$454 AT CHAMPION BLOWER AND FORGE

$846 AT HARRIS-SEYBOLD

$925 AT LEWISTOWN FOUNDRY

$423 AT YATES-AMERICAN MACHINE

In foundries from coast-to-coast, famous Pangborn ROTOBLAST is setting *new records* for *low-cost, high-quality* blast cleaning. Cases in Pangborn's files prove ROTOBLAST cuts cleaning costs up to 50%, reduces cleaning time *by* ½—gives you cash savings in time, labor and overhead.

In a large Ohio foundry, ROTOBLAST saves almost $1000 a month on labor alone. In a medium size eastern foundry, ROTOBLAST saves more than $100 a week. And in a jobbing foundry, one Pangborn ROTOBLAST unit has replaced five old-fashioned machines, cleans castings 18 times faster!

No matter what type or size castings you make, whether your production is large or small, there's a ROTOBLAST *Table, Barrel, Table-Room* or *Room* especially designed to save you money. *Get all the facts.* Bulletin 214 tells the complete story, contains specifications and technical details. Write for your free copy today to: PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md.

MORE THAN 25,000 PANGBORN MACHINES SERVING INDUSTRY

BLAST CLEANS CHEAPER

with the right equipment for every job

MAKE 'EM BETTER—QUICKER—CHEAPER!

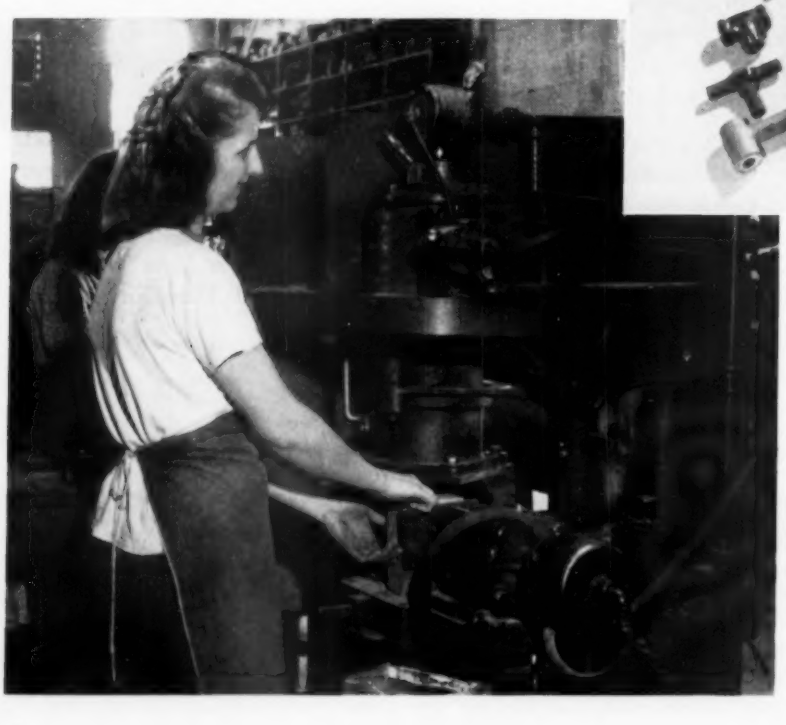
IN OTHER WORDS—

"Champion ize" YOUR FOUNDRY

FOR THE RESULTS OTHER PROGRESSIVE PLANTS ARE GETTING

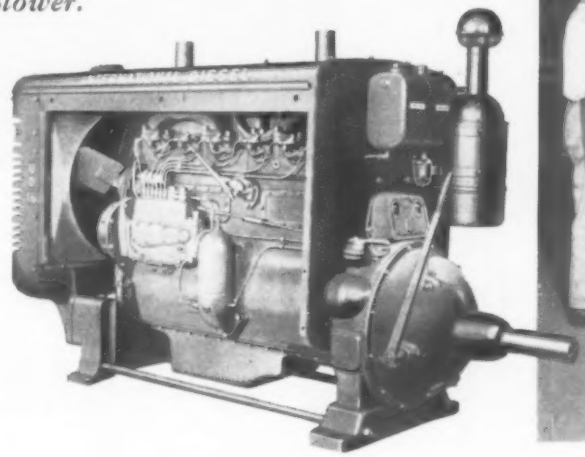
"Big or small...

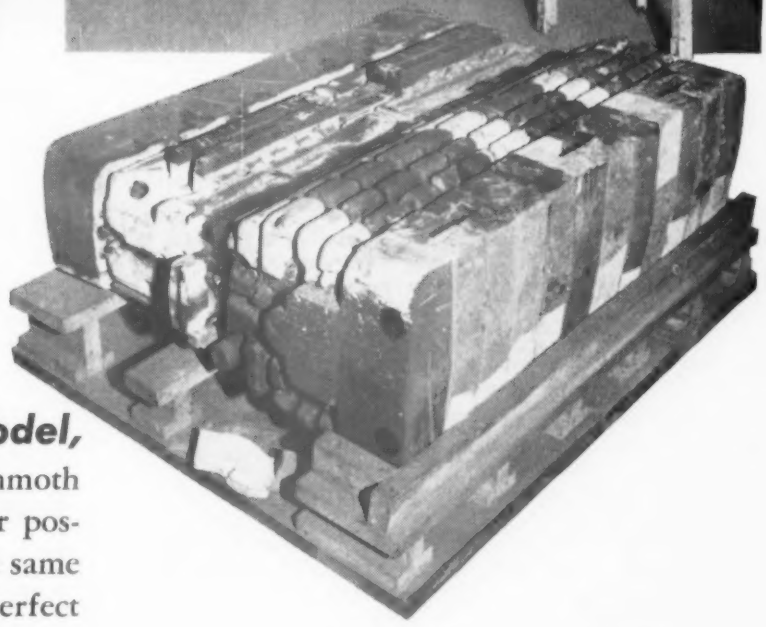
you can blow 'em all—on Champions" —is no idle boast. Leading foundries such as represented in this advertisement are daily proving that you can blow 'em faster, at less cost, with more uniform quality and precision with Champions!



Operating a Champion CB-10 core blower is an easy, pleasant and safe occupation for this girl. Cores are used in brass castings for high grade plumbing fixtures. Photos courtesy Federal-Huber Company.

The largest Champion core blower, a CB-400, at work in the Milwaukee foundry of International Harvester Company producing cores for Diesel engine castings. The actual work of operating the control valves on this machine is no greater than that required on the smallest Champion Core Blower.





From the newest, smallest model, the "Junior" Champion, up to the Mammoth CB-400, every Champion Core Blower possesses the same distinctive features, the same unique blow valve, which assure a perfect core every time, in a fraction of a second, with the standard air pressure of 85 pounds. Operation is safe, simple, speedy! There's a size and type for every job.

Talk with us about your core requirements . . . you'll find it pays!

CHAMPION FOUNDRY AND MACHINE COMPANY

SALES OFFICE: 1314 W. 21st STREET, CHICAGO 8, ILLINOIS

GENERAL OFFICE AND PLANT: ROCKFORD, ILLINOIS

MOLDING MACHINES CORE BLOWERS THE ELECTRIC RIDDLE

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Caixa Postal 1411, Sao Paulo

CHILE
Mauricio Hochschild & Cia, Ltd.
Casilla 153 D, Santiago, Chile

CUT Core Making Time From Days to Minutes!

YOU CAN ELIMINATE the three costly steps shown in the chart at right using the *Foundromatic* Sand Core dryer. This means you no longer need start making cores days or weeks ahead of time unless you want to. With this new unit, cores are ready for the molder immediately after leaving the dryer . . . minutes after leaving the core maker.

SAVE 80% TIME PLUS FUEL

Even figured on the basis of the drying operation alone, you save at least 80% in time. Add to this, fuel savings of 30 to 80% (depending on the type of fuel and binder you are now using) and you begin to see the tremendous advantage of this revolutionary new system.

NO OVERBAKING OF CORES

You eliminate burning of fins or thin sections of cores . . . reduce rejects. Working conditions are improved too. Fumes and heat are eliminated from core room.

Any core that will pass through an aperture 13 in. high and 36 in. wide can be dried by the standard Sand Core dryer.

PROVED IN A-C'S OWN FOUNDRIES

Allis-Chalmers engineers will gladly study your core requirements and recommend proper equipment to fit your production set-up. Their advice is based on several years operation in A-C's own huge foundries. Call your nearby A-C Sales Office, or write direct.

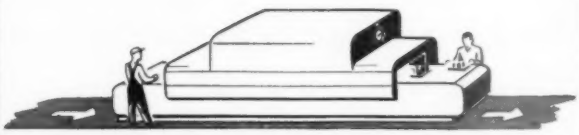
A-2985

ALLIS-CHALMERS, 1032A SO. 70 ST.
MILWAUKEE, WIS.

Foundromatic is an Allis-Chalmers trademark.

OLD WAY

FOUNDROMATIC DRYER WAY



3 STEPS YOU CAN ELIMINATE

Eliminating these 3 steps with the *Foundromatic* Sand Core dryer means you cut core making time from days to minutes.

1. Eliminate collecting racks. Cores are placed directly onto the moving conveyor belt of the *Foundromatic* Sand Core dryer.

2. Eliminate cooling racks. When cores come out of dryer, they're cool enough to be handled bare-handed.

3. Eliminate curing and storage racks. Cores can be made as needed in a matter of minutes, without building stocks on curing and storage racks.

ALLIS-CHALMERS

THESE TESTS PROVE Malleabrasive CUTS CLEANING COSTS up to 50% and more!

Results of four recent Malleabrasive tests conducted independently by four typical foundries.

TEST #1

Made by: Cortland Forging Division of Brewer-Titchener Corp.
Total savings with Malleabrasive:

57.2%

Savings on replacement parts: 70%
Savings on abrasive: 45%

Remarks: Two tests were conducted, each for 30 days. Result of the first test showed 35% saving on abrasive. To check results a second 30-day test was run. This test showed savings of 45% on abrasive.

TEST #2

Made by: Reading Gray Iron Castings, Inc.
Total savings with Malleabrasive:

51.8%

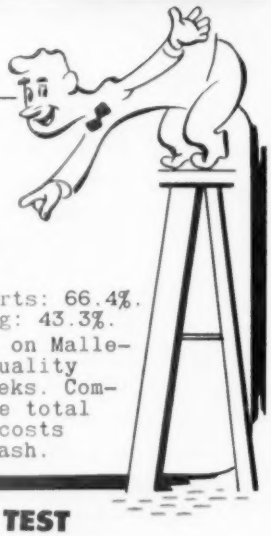
Savings on replacement parts: 64.7%.
Production increased: 25.4%.

Remarks: Test was run for seven weeks. Malleabrasive was compared with standard quality abrasive normally used for this type of cleaning. Test also showed abrasive handling cut by ½.

TEST #3

Made by: Crucible Steel Castings Co.
Total savings with Malleabrasive:

35.9%



Savings on replacement parts: 66.4%.
Saved on abrasive handling: 43.3%.

Remarks: Comparative test on Malleabrasive and a standard quality shot was run for seven weeks. Computed on a cash basis, the total 35.9% saving on cleaning costs adds up to $5,283.20 in cash.

TEST #4

Made by: Ohio Forge & Machine Corp.
Total savings with Malleabrasive:

58.9%

Saved on replacement parts: 81.3%.
Saved on abrasive cost: 43.5%.

Remarks: Using Malleabrasive in the cleaning room increased this foundry's production 12.8%. The comparative test held by this company lasted seven weeks, with all costs carefully recorded.

MAKE THIS AMAZING TEST IN YOUR PLANT!

Now you can test Malleabrasive *right in your own plant!* We'll send you all data needed to prove Malleabrasive cuts cleaning costs up to 50% and more. Remember, Malleabrasive is more than "heat treated" or "annealed." Malleabrasive is *guaranteed to outperform* ordinary shot and grit when comparative tests are properly made. Send for your test kit today . . . just write for TEST INFORMATION, to: THE GLOBE STEEL ABRASIVE CO., Mansfield, Ohio.

Packed in new orange striped 100 lb. bags.

†U.S. Patent #2184926
(other patents pending)

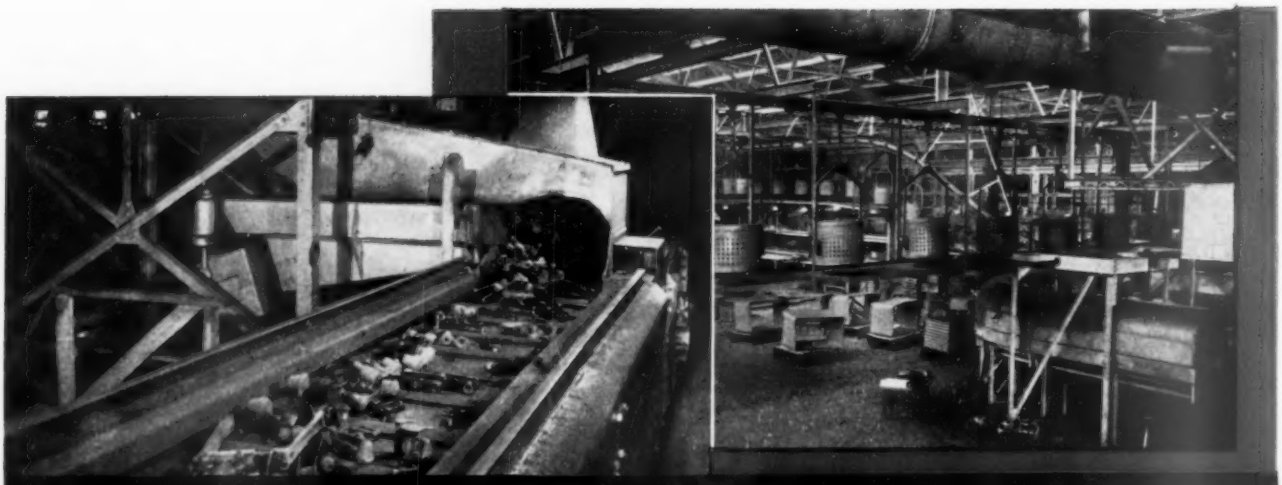
Save on blast cleaning with

PATENTED†

Malleabrasive®

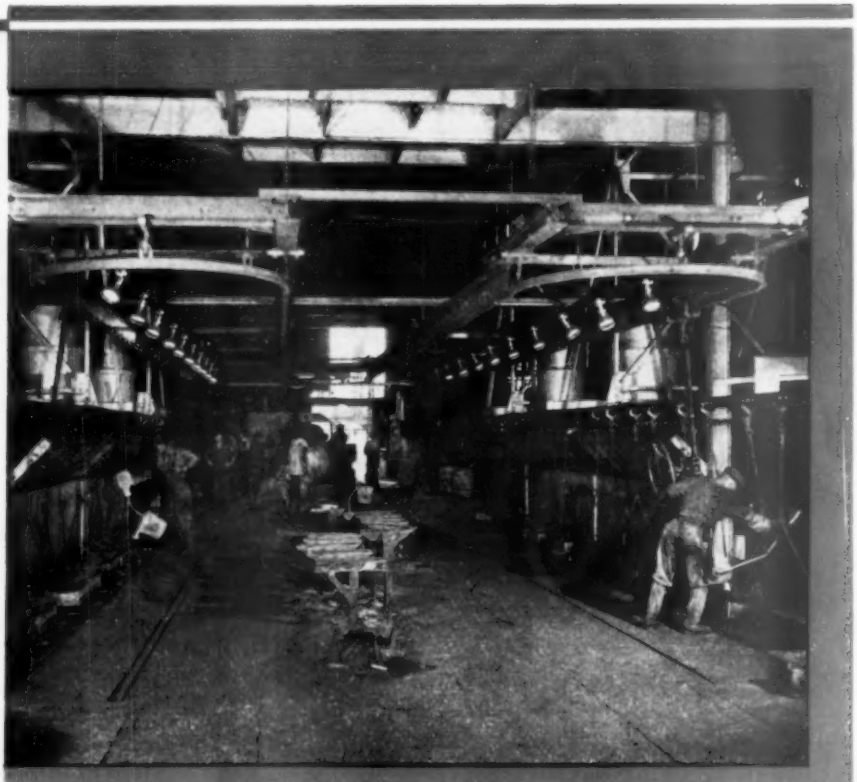
THE GLOBE STEEL ABRASIVE CO., MANSFIELD, OHIO

· MANUFACTURERS OF METAL ABRASIVES SINCE 1907 ·



Volume increased by complete mechanization

No lost motion from cupola to finished product



These three views were taken in a recently-modernized Malleable Foundry . . . Jeffrey-equipped for non-stop production. Here is sand and casting handling at its best. We would like to tell you more about it.

Jeffrey Mold Conveyors, Trolley Conveyors, Belt Conveyors, Steel Apron Conveyors, Continuous Molding Stations and Electric Vibrating Feeders . . . all contribute to the success of this high-speed foundry operation. Write for more details . . . if you are looking for peak efficiency and increased volume.

THE JEFFREY MANUFACTURING COMPANY

ESTABLISHED 1877

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Complete Line of Material Handling, Processing and Mining Equipment

JEFFREY MFG. CO., LTD., Head Office and Works, MONTREAL

bvb

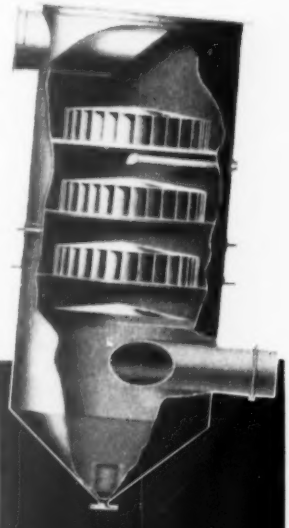
WILL ASSURE YOU NEW FOUNDRY EFFICIENCY AND OPERATING ECONOMIES NEVER BEFORE ACHIEVED

WATCH FOR FURTHER DETAILS . . SEE OUR EXHIBIT AT THE CLEVELAND SHOW—BOOTH NO. 1103

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

CLAUDE B. SCHNEIBLE COMPANY
P.O. BOX 502 DETROIT 32, MICHIGAN

Products: Multi-Wash Collectors • Uni-Flo Standard Hoods • Uni-Flo Compensating Hoods • Uni-Flo Fractionating Hoods Water Curtain Cupola Collectors • Ductwork • Velocitrap Dust Separators • Entrainment Separators Settling and Dewatering Tanks • "Wear-Proof" Centrifugal Slurry Pumps



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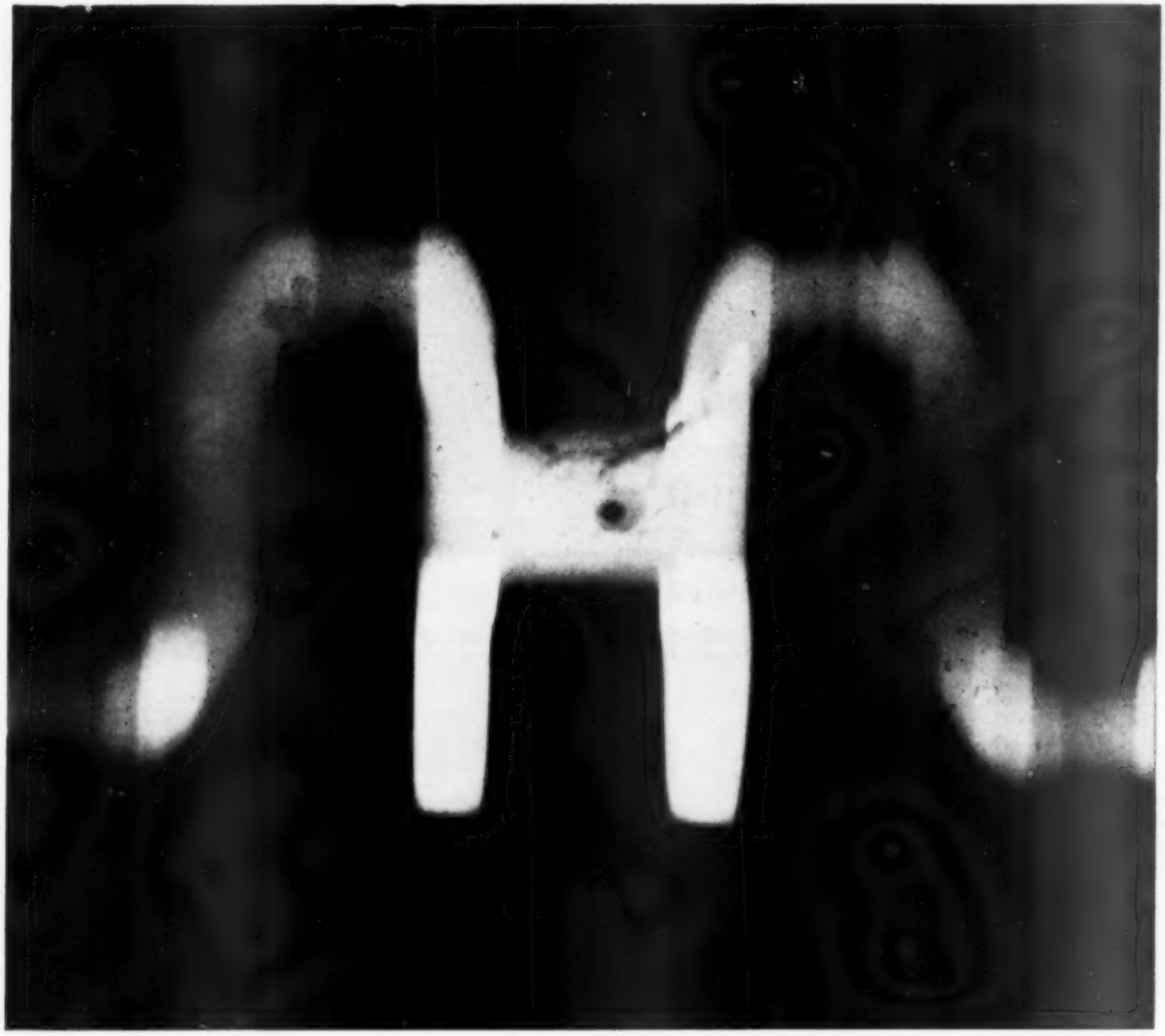


Here's why — Radiography cuts down rejects . . . ups profits!

With radiography at his command, the bugaboo of subsurface defects need no longer plague the foundryman. For here's a vital foundry tool that enables him to detect internal discontinuities prior to the production run and before expensive machining. As an inspection device, industrial x-ray is often a swift substitute for physical test and sectioning. But its applications are much broader.

GE Industrial X-Ray has become a *development* tool. It not only diagnoses, but suggests treatment. It shows where savings can be made, designs improved, new techniques developed.

Is there a place for industrial x-ray in your business? A General Electric X-Ray engineer will be glad to talk it over. Or write for Pub. 11A-3116 "Radiography as a Foundry Tool." Address General Electric X-Ray Corporation, Dept. YY4, Milwaukee 14, Wisconsin.

GENERAL ELECTRIC
X-RAY CORPORATION

A New PAYLOADER

model HE ½ yard

. . . with ALL the PAYLOADER Advantages

- Loads big trucks
- Four forward and four *faster* reverse speeds up to 23 mph.
- Separate, quick forward-reverse shift
- Full hydraulic control of bucket — lift, dump, close, lower
- Automatic quick tip-back of bucket
- Powerful hydraulic digging action
- Stability and maneuverability for fast, safe operation in close quarters
- Full visibility for the operator
- Large earthmover tires for maximum traction on and off pavements

Here is a new Hough PAYLOADER . . . a new size of PAYLOADER that sets new standards of performance, usefulness and durability for ½ yard tractor shovels. It has the many features that have made Payloaders first choice in industry for handling bulk materials.

It is an integral design of tractor and loader, completely Hough-built, with a balanced combination of pneumatic tire traction, flotation, operating speed, maneuverability and over-all usefulness . . . to dig, load, carry, stockpile, spread and windrow materials . . . to lift, lower, pull and push — indoors and outdoors . . . on hard surfaces or on loose ground.

Your Hough Distributor is eager to put this brilliant performer through its paces for you. See him today or write The Frank G. Hough Co., 703 Sunnyside Avenue, Libertyville, Illinois.

Send for catalogs on the new ½ yard HE Payloader or any others — the 12 cu. ft. HA, the ¾ yd. HF, the 1¼ yd. HL, or the big 4 wheel drive 1½ yd. HM.

HOUGH PAYLOADER

Manufactured by THE FRANK G. HOUGH CO.

BETTER 4 WAYS

FOR GREEN SAND FACING

BETTER FLOWABILITY

BETTER WORKING SAND

BETTER MOLDS

BETTER CASTINGS

You can get all of these advantages simply by adding one-half of one per cent by weight of "Hercules" NVX to your green sand facing. Prove it with a production-scale test. 100-lb. test lots of NVX are now obtainable at the recently reduced 1000-lb. price.

HERCULES POWDER COMPANY
920 King Street, Wilmington 99, Delaware

HERCULES **NVX**

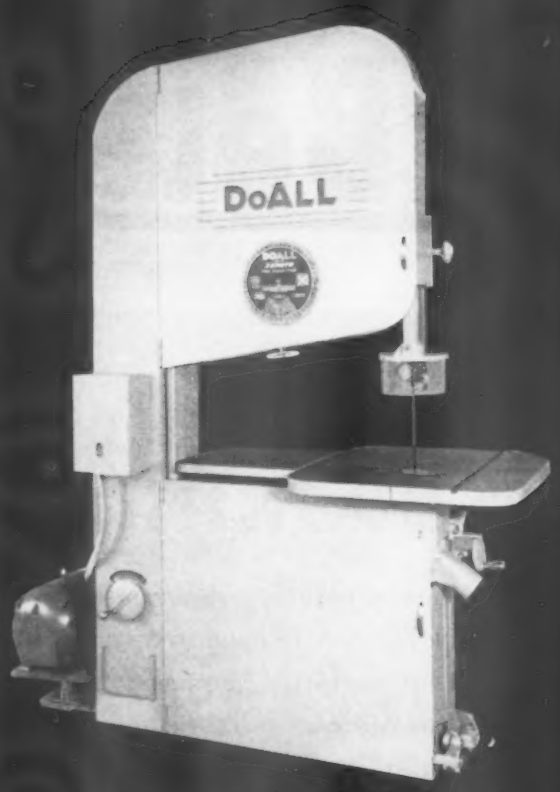
"HERCULES" IS REG. U. S. PAT. OFF.

NF50-1

Efficiency of . . .
Continuous BAND CUTTING
Now Extended to the CUTTING of ALL SOLID MATERIALS

New DoALL Band Machines and cutting tools for 1950 give up to 200% faster production cutting and up to 100% longer tool life in the trimming and cutting of ferrous and non-ferrous castings. Tough alloys that have defied economical cutting are now profitably sliced apart with ease on DoALL Band Machines and cutting tools.

Only DoALL gives you a range of sizes, kinds and operating speeds that are tailored to your specific needs.



Super Zephyr — High Speed and Friction Sawing Machine with 36" capacity — 21 models tailored to your needs in speed range.

Low-Cost Utility DoALLs — 5 models — various speeds — 16" capacity.

Contour Machines—5 models — 16" to 60" capacity — variable speeds.

Contour-matic—the first Band Machine Tool with complete Hydraulic Operation and variable speed range from 40 to 10,000 F.P.M.

SEE DEMONSTRATIONS at FOUNDRY CONVENTION
Cleveland, May 8–12

These latest Foundry and Pattern Shop Machine Tools will be in operation cutting all kinds of castings, patterns, etc. demonstrating:

Friction Sawing **Contour Sawing**
Line Grinding **High Speed Sawing**

DoALL Exhibit No. 1200

27 Kinds BAND CUTTING TOOLS

for

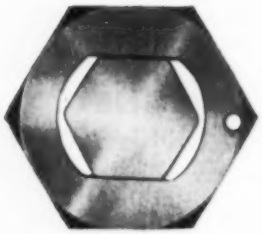
Line Milling
Line Grinding
Contour Sawing
Friction Sawing
Continuous Filing
Polishing
Honing

The DoALL Company
Des Plaines, Ill., U.S.A.
Cable Address: DoALL Des Plaines

Representatives in 56 Countries
DoALL Stores in Key Cities

WRITE for literature and information That will give you . . .
FREE DEMONSTRATIONS IN YOUR PLANT
No obligation, of course.

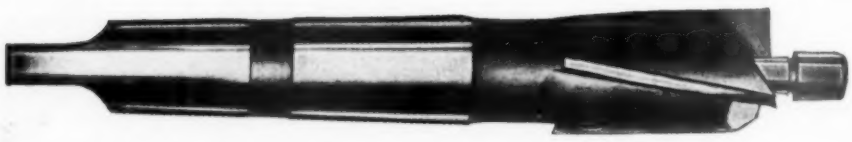
NOW...Better t



THE IMPROVED HINES PINS AND BUSHINGS

Our pins and bushings have been thoroughly re-engineered. A new factory technique is now being employed in their construction. While closer tolerance is permitted by reason of this new technique, friction between pin and bushing has been reduced almost 50%—and the pins and bushings themselves are more uniform, harder, and much better in all details. They don't rust, they don't bind, and they don't require lubrication. Extremely useful where ever good, accurate pins and bushings are required, they are just what your pattern department needs. Because they are hardened and chrome plated, they resist wear.

The original Hines pins and bushings are of our own design. They have been on the market for 25 years, and the several hundred thousand now in use are still giving good service. This wide acceptance is clear evidence of their usefulness in all foundries.



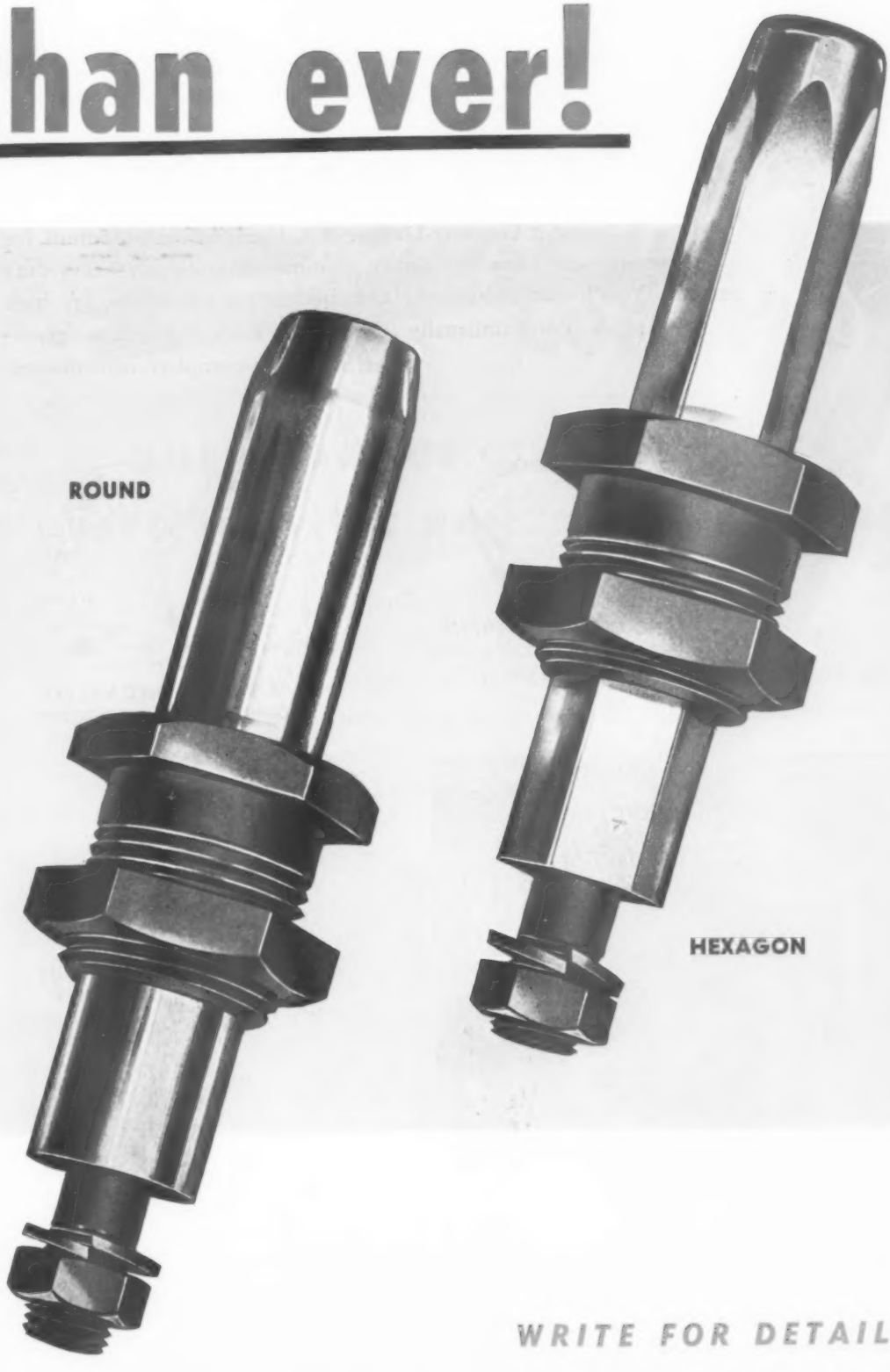
TOOLS FOR INSTALLATION

This counterboring tool and wrenches are the only tools needed for an installation of Hines Pins and Bushings.

THE HINES

3431 WEST 140th ST.

r than ever!



- CLOSER TOLERANCE
- NO BINDING
- NO LUBRICANT
- HEAVY CHROME PLATE
- NO RUSTING
- RIGIDLY INSPECTED
- GUARANTEED

WRITE FOR DETAILS AND PRICES

S FLASK CO.

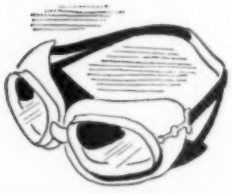
CLEVELAND 11, OHIO

When you need Air

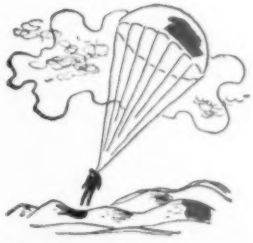
DAY and NIGHT . . .

Choose a Gardner-Denver RX Compressor — famous for economy and efficiency under continuous, full-load, heavy-duty service. You'll find volumetric and mechanical efficiencies are high — power costs unusually low. Check these RX advantages — then write for complete information.

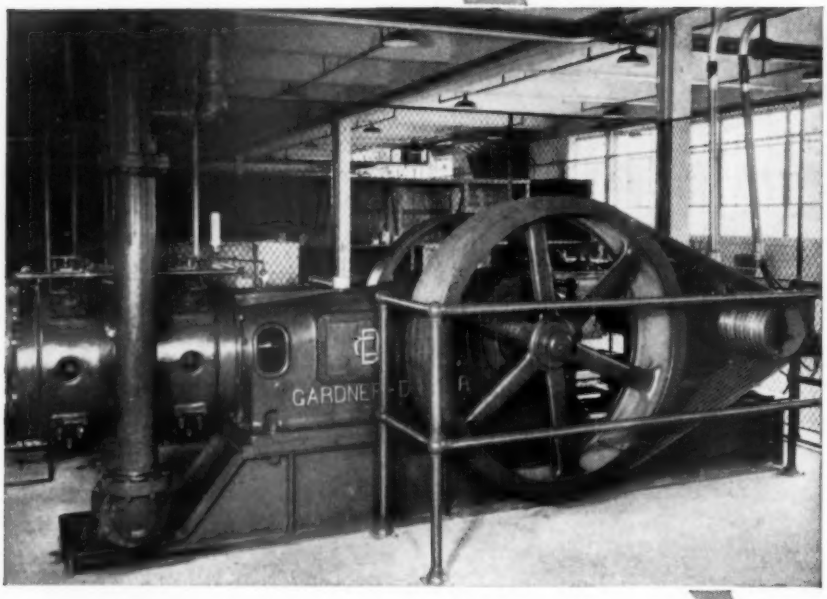
LARGE VALVE AND PORT AREAS
ASSURE UNRESTRICTED AIR FLOW



ENCLOSED MAIN FRAME
PROVIDES PROTECTION AGAINST DUST AND DIRT

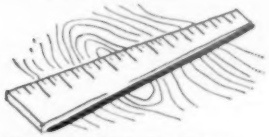


AIR-CUSHIONED VALVES
QUIET, DURABLE, AND EFFICIENT



AUTOMATIC LUBRICATION
POSITIVE AND TROUBLE FREE

AUTOMATIC CONTROL
LIMITS POWER CONSUMPTION TO AIR DEMAND



WIDE RANGE OF SIZES
ASSURES CAPACITY AND PRESSURE TO FIT YOUR NEEDS EXACTLY

Gardner-Denver RX Single-Stage, Water-Cooled Compressors are made in capacities from 89 to 1292 cubic feet displacement per minute, for pressures from 20 to 150 pounds. Write for illustrated bulletin.

Since 1859

GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada) Ltd., Toronto, Ontario

How Delco Core Oil *Simplifies* Core Production

ONE GRADE OF OIL, ONE TYPE OF SAND USED ON WIDE RANGE OF SIZES AND METALS

"We are producing grey iron, semi-steel and alloyed iron castings, ranging from 1¼ oz. to 2500 lbs. With the 36 Core Oil, the ratios vary but we use the same sand for all sizes of cores with a resulting uniform strength. Large castings can be poured with unsupported runner boxes.

With the 36 core oil, only water and cereal binder are used with the sand, and no other preparations are added. This oil is practically odorless and works good in either freezing or hot weather."

Features of Cities Service 30 Series Core Oil that are building preference throughout the industry:

BETTER PERFORMANCE in core boxes, whether blown or hand rammed, whether sand is washed and dried or crude.

FASTER DRYING TIME without recourse to older types of drying oils.

WIDE RANGE OF WORKING TEMPERATURE—ready for use without pre-conditioning whether in Texas or Montreal.

BAKES OUT AT LOWER TEMPERATURE, saves time, oven capacity and fuel.

HAS A CLEAN, PLEASANT ODOR.

MADE IN FIVE QUALITY RANGES accommodating all local foundry and core room conditions.

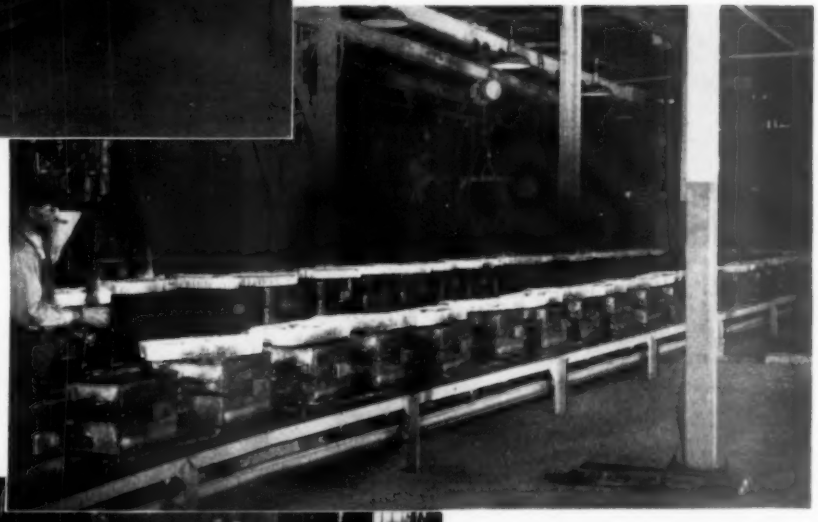
This report from Nelson Electric Manufacturing Company, Tulsa, Oklahoma, is typical of the experience in numerous foundries where Delco Series 30 Core Oils are in use. You too, can enjoy the following advantages. Let Cities Service representatives aid you in choosing and applying the correct grade of Delco Core Oil to your requirements. Their service is prompt, dependable, valuable—and *free.* Cities Service Oil Company, Chicago, Cleveland, Kansas City, St. Paul, Toronto; Arkansas Fuel Oil Company, Shreveport.

DELCO CORE OILS • ROSINAL LIQUID CORE BINDER • DELCO CORE AND MOLD WASH

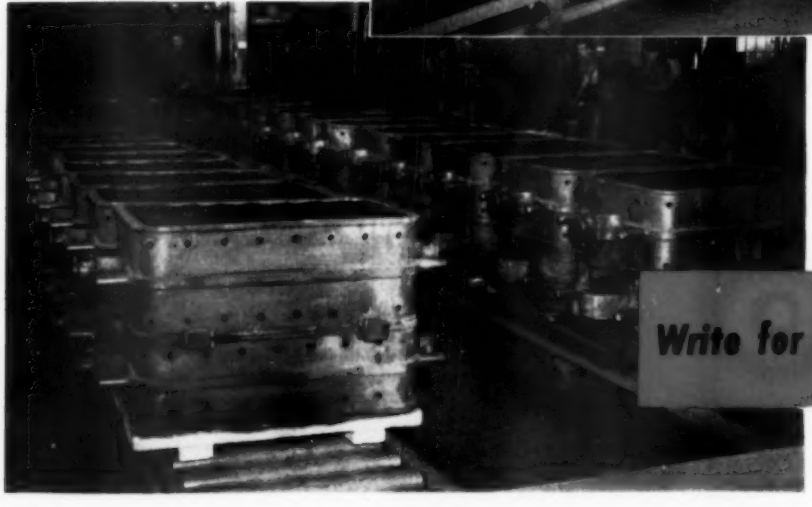
CITIES SERVICE

Industrial!

... PREFERRED FOR PERFORMANCE



THESE photos show "Industrial" flasks in actual operation at prominent foundries in the United States and Canada. Names on request.



Write for catalog

I.F.I.

INDUSTRIAL FABRICATING, INC.

817 HALL STREET ★ EATON RAPIDS, MICHIGAN ★ TELEPHONE 6781

IN CANADA: Don Barnes Foundry Supplies & Equipment 42 James Street, South, Hamilton, Ontario

VOLCLAY Bentonite

No better testimony than your gratifying words:

"Repeat Order"

As we look over the list of customers who bought the hundreds of carloads of Volclay Bentonite already shipped in 1950, we see that nearly all of them are firms who have used it steadily for 5 to 10 years and longer. Some began to use Volclay in 1929 and have bought it every year since.

There is a deep satisfaction in having a material which has been so steadily used by foundries, chemical plants and process industries whose finished products rank among the nation's best.

Every time you say "Repeat Order" you add another recommendation for Volclay, the bentonite which has been industry's standard of quality since 1927.

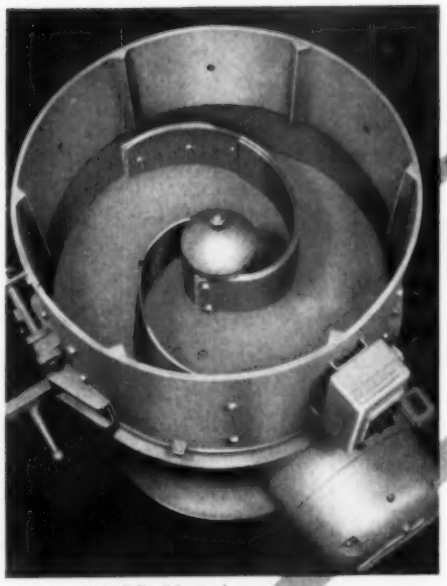
Produced by

American Colloid Company

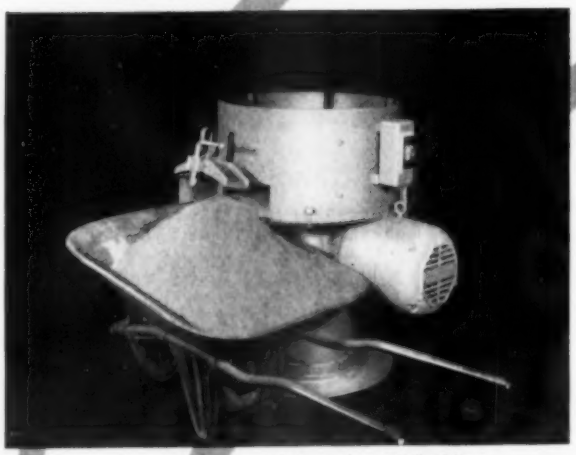
Merchandise Mart Plaza • Chicago 54, Illinois

Repeat Order...Repeat Order...Repeat Order...

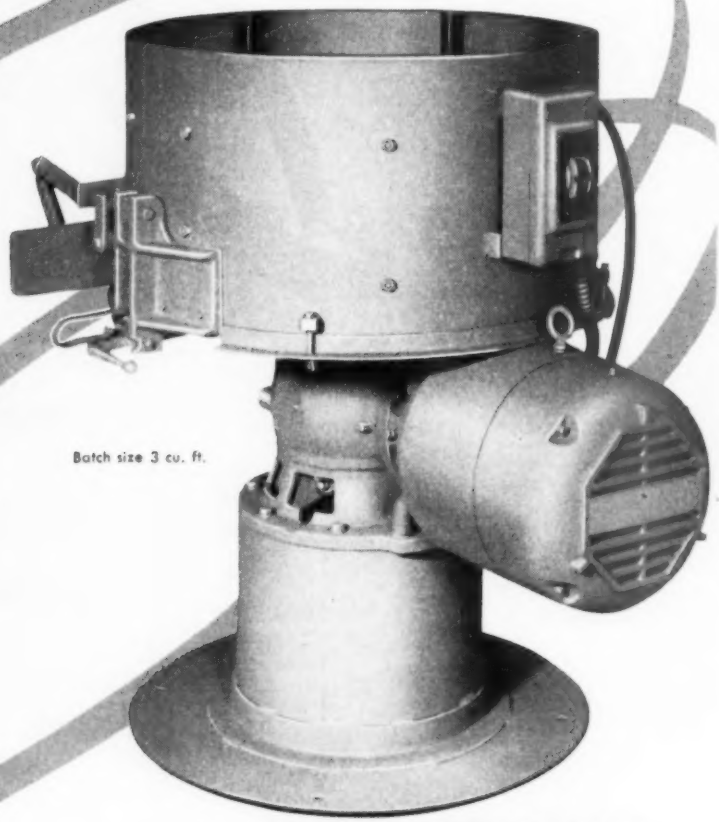
WHIRLMIX



Note 2 flexible steel rubbing arms.



Discharge door is 28" off floor, high enough to accomodate a 3 cu. ft. wheelbarrow.



Batch size 3 cu. ft.

NEW SAND MIXER

SMALL IN SIZE- BIG IN PRODUCTION

• The Whirlmix, a big producer, will mix more sand per hour at lowest cost . . . 4,000 lbs. of oil core sand or facing sand *per hour.*

Small—compact, the Whirlmix is an integral unit which does not require a foundation. Weighs only 1,060 lbs. Can be moved easily by crane or lift truck from one location to another.

Two flexible spring steel whirling arms exert the proper pressure to the sand. No crushing of sand grains; no overheating of sand. This produces a uniform mixture of either core oil, dry core compound, or facing sand. The Whirlmix gives you a fluffy sand (does not need aerating), efficiently mixed without crushing.

If you want a mixer which will give you tonnage, an efficient mix, and complete satisfaction, write us today about this new sand mixer . . . Whirlmix (Model No. 300) . . . small in size, a little giant in production . . . only $1,185 f.o.b. Cleveland, Ohio.

SEE YOU AT BOOTHS 1112 AND 1116

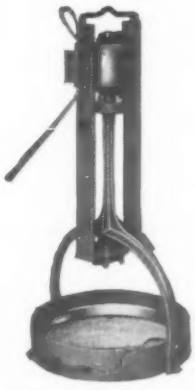
FEDERAL

- 4000 lbs. per hour
- Produces Fluffy, Aerated Sand
- No Hot Sand
- Portable
- No Crushing of Sand Grains

Federal

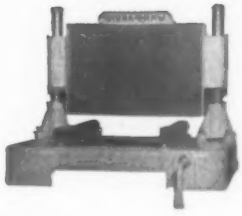
CLIMAX WIRE STRAIGHTENERS

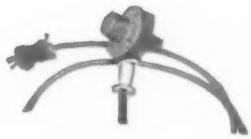
Any foundry, large or small, can cut production costs by straightening and reusing core wires and rods. With a Climax Wire Straightener this can be done quickly, economically, safely —by unskilled labor. A complete descriptive circular is yours for the asking.

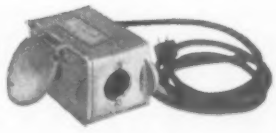


FEDERAL'S LOWE SIFTER

Save money by faster sifting, better sand conditioning with a Lowe Electric Sifter. Features: greater screening area, enclosed ball bearing motor, more shoveling room. Write for information. Prompt delivery.







TWISTED STEM CHAPLETS

The chaplet with everything. The "Twisted Stem" promotes rapid complete fusion. Not deformed, the stem has no weak spot to burn in and permit core shift. Made in a complete range of sizes. Samples of the size you use, gladly submitted.

"The Twist Does the Trick"

FEDERAL'S "VIBRA-DRAW" CORE DRAWING MACHINE

Cuts costs in your core room by making it easy for every core maker to draw perfect cores as fast as he can fill the core box, place it against the vibrating head and lift the box. Made in two styles: the floor model and the portable bench model shown at left. Immediate delivery—write for details.

SHUR-SPOT SPRUE

Designed for use on squeezer-made molds, Shur-Spot squeezes right down with the sand. When the squeezer board is removed, the Shur-Spot pops up and can be lifted right out. The result is a fully completed and properly located pouring sprue that requires no finishing. Shur-Spot Sprue eliminates danger of falling sand.

For complete information on the Shur-Spot Sprue, write for the circular on this low-priced, easy-to-use item.

FEDERAL VIBRATOR No. 2 & 5

Federal's own make and available for immediate delivery. Hard-chromed piston guarantees long life. For 110 volt, 60 cycle, single phase operation. $13.00 each, f.o.b. Cleveland; No. 5 for heavier duty—$17.00 each.

Federal also has a new "convenience outlet knee switch." No taping, soldering or wiring. Plug in—that's all. Carried in stock. $7.50 each, f.o.b. Cleveland, Ohio.

SEE YOU AT THE SHOW
BOOTHS 1112 and 1116

THE FEDERAL FOUNDRY SUPPLY COMPANY

4600 East 71st Street • Cleveland 5, Ohio

CROWN HILL, W. VA. · CHICAGO · MILWAUKEE · RICHMOND, VA. · ST. LOUIS

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4 REASONS WHY

FERROCARBO Briquettes help produce top quality Cast Iron

1 MORE EFFECTIVE DEOXIDATION

Readily soluble in molten iron, the components of FERROCARBO briquettes provide powerful deoxidation. Oxides are reduced and eliminated. Super-heated iron of greater fluidity is obtained. Foundry operating variables are reduced. Cleaner, sharper castings are poured.

2 IMPROVED STRUCTURE

Irons which have been deoxidized with FERROCARBO briquettes are characterized by a dense, close-grained structure, free from chill or porous areas even though varying widely in metal section. Segregation is eliminated.

3 SUPERIOR MECHANICAL PROPERTIES

The use of FERROCARBO briquettes insures iron structure with higher physical values.

4 PROLONGED TOOL LIFE

Iron which is deoxidized with FERROCARBO briquettes promotes longer life of the machine tools.

CUPOLA addition of FERROCARBO silicon carbide briquettes to a properly adjusted charge greatly lengthens the useful life of all types of cast iron. For metallurgical advice on their use in your operation write Bonded Products and Abrasive Grain Division, Niagara Falls, New York.

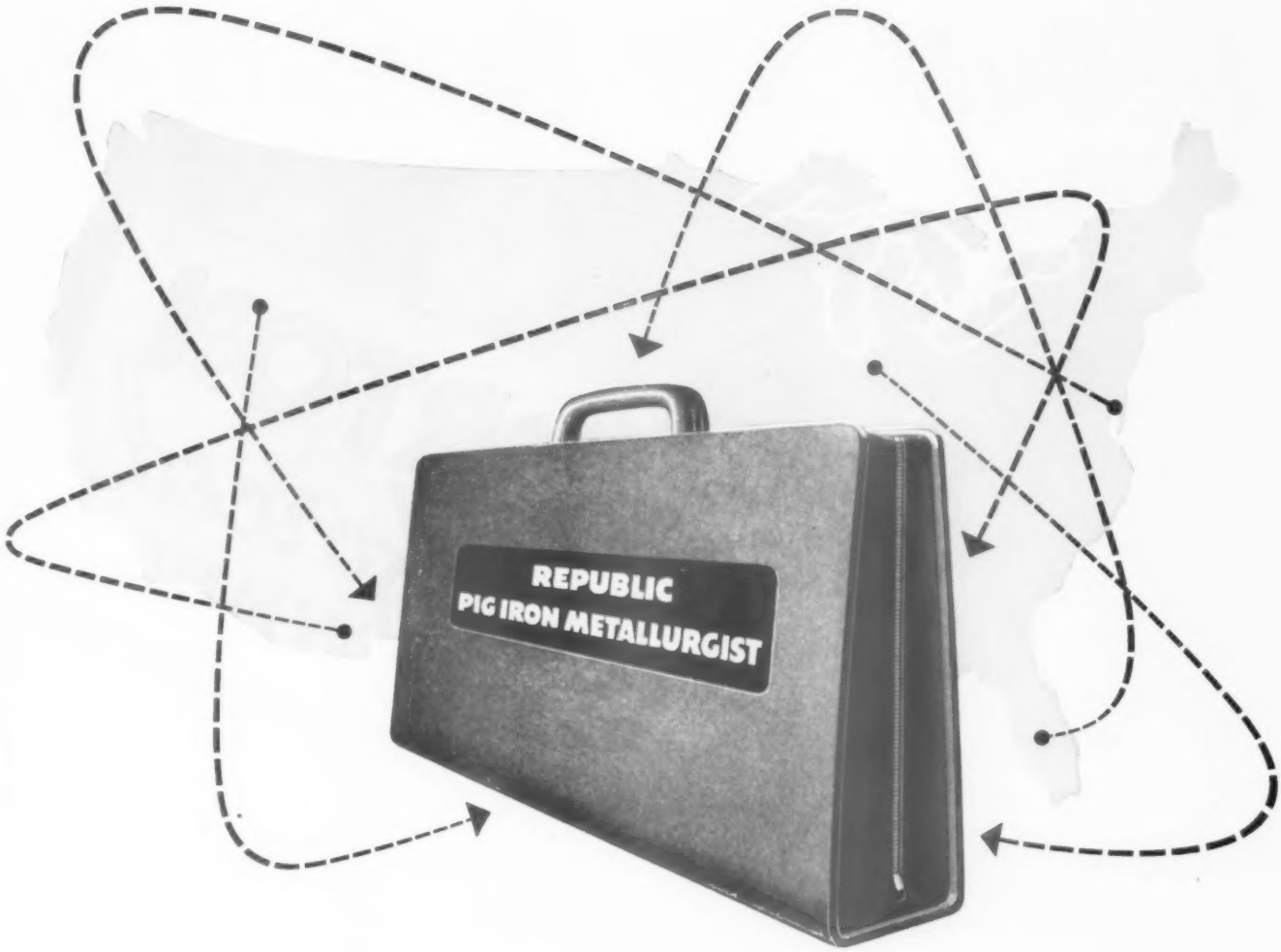
FERROCARBO-S

BY CARBORUNDUM

TRADE MARK

FERROCARBO Distributors: KERCHNER, MARSHALL & CO., PITTSBURGH, Cleveland, Birmingham, Philadelphia and Buffalo; MILLER AND COMPANY, CHICAGO, St. Louis and Cincinnati; WILLIAMS AND WILSON, TORONTO, Montreal and Windsor.

"Carborundum" and "Ferrocarbo" are registered trademarks which indicate manufacture by The Carborundum Company



This brief case really gets around!

Truly a traveling brief case, is the one carried by a Republic Pig Iron Metallurgist. Equally at home in Mainliner cabin, Pullman berth or fast-moving car, it's often heading for trouble . . . foundry trouble that needs to be corrected.

Other times, it is on its way to forestall trouble . . . furnishing the answers to routine questions about molding practice . . . offering suggestions for improving castings or cutting production costs.

As countless foundrymen will testify, it never stays long enough to wear out its welcome, but its visit seldom is soon forgotton.

Perhaps you have some unanswered questions or unsolved problems which might be cleared up by a visit from a Republic Pig Iron Metallurgist. Just let us know when you would like him—and the brief case—to stop.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N.Y.

Republic **PIG IRON**

"CHATEAUGAY" Low-Phosphorus, Copper-Free

"REPUBLIC" (Northern) Foundry, Basic and Malleable

"PIONEER" (Southern) Foundry and Basic

REPUBLIC STEEL

ALSO TRUSCON FOUNDRY FLASKS • REPUBLIC CORE WIRE • FOUNDRY NAILS

It Cuts . . It Smooths . .

AT PHILADELPHIA — AT CLEVELAND

See for yourself how the new NORTON REINFORCED Hub Wheel can save you money. See it in action at the Tool Show and Foundry Show.

Abrasives · Grinding Wheels · Grinding and Lapping Machines · Refractories · Porous Mediums · Non-slip Floors · Norbide Products · Labeling Machines

Now you can Cut, Rough Grind and Finish Grind with the Same Wheel!

STRONGER and SAFER

Comparison will convince you that the new NORTON REINFORCED Hub Wheel is a stronger, safer wheel for use on your right-angle portable grinders and sanders. Layers of strong, fibrous material, plus a special safety web molded into the back of each wheel, prevent it from flying apart in use even though accidental breakage should occur.

FASTER CUTTING

Comparison will convince you that this new Norton wheel cuts as fast, and often faster than other wheels of similar type. It cuts fast and clean without spalling and loading, because it contains sharp, durable ALUNDUM abrasive, a special resinoid bond and has a unique file-like cutting surface.

LONGER LIFE

Comparison will convince you that you get longer, more economical life with a NORTON REINFORCED Hub Wheel — the strongest, most durable wheel of its type on the market. Many plants have discovered that this wheel lasts two to three times longer than wheels used previously.

VERSATILE

And comparison will prove to you that this wheel is really versatile. Now you can rough and finish grind with the same wheel — ***and you can notch with it too!***

Rough grinding heavy weld bead prior to finish grinding with same wheel.

Notching risers on ferrous casting prior to knocking off with sledge.

Smoothing surface of large brass casting. Note how easily wheel gets into corner.

NORTON ABRASIVES

Make the comparison in your shop. Contact your Norton abrasive engineer or distributor for full details, or write for your free copy of the folder on "NORTON REINFORCED Hub Wheels".

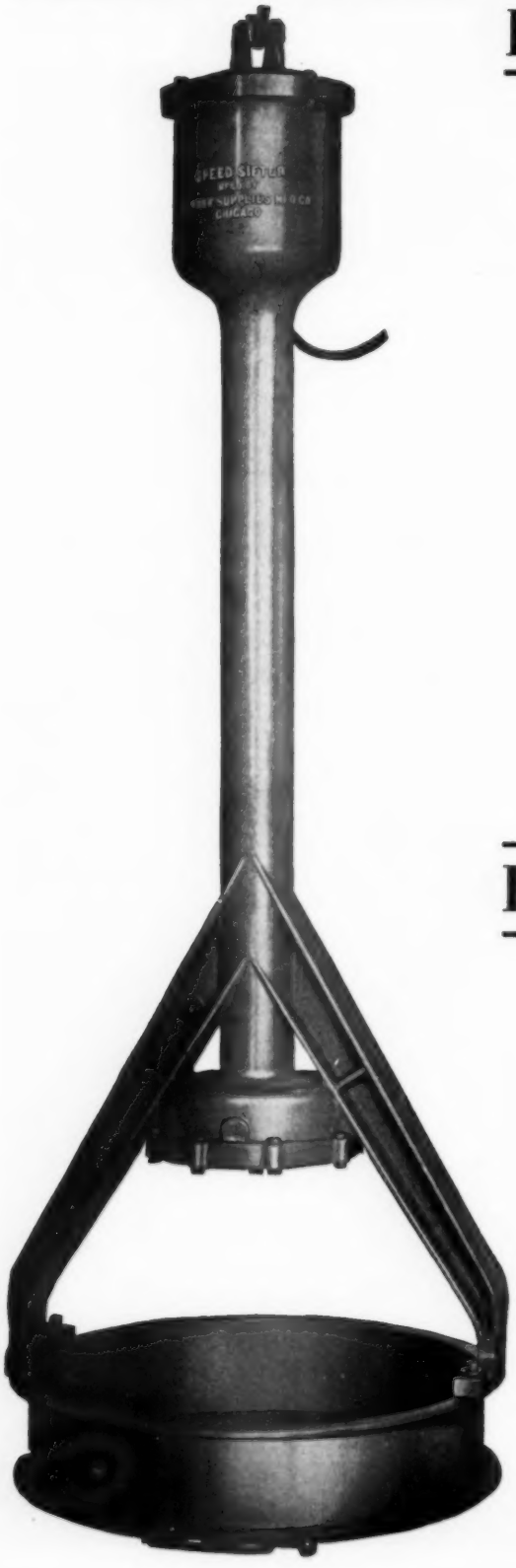
W-1288

NORTON COMPANY, WORCESTER 6, MASS. · Warehouses in Five Cities · Distributors in All Principal Cities

Increase Production

with the

ROTOPLANE SPEED SIFTER ★ RED ELECTRIC VIBRATORS



ROTOPLANE SPEED SIFTER

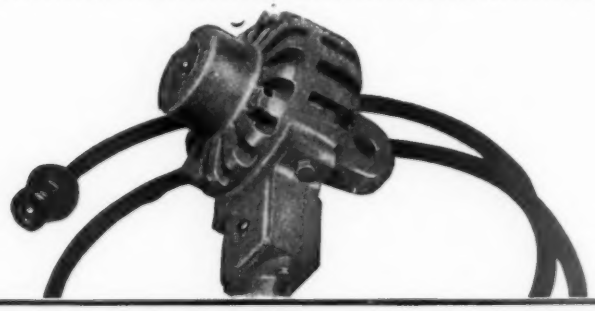
The ROTOPLANE Speed Sifter is an *improved* sand riddle of much greater capacity and much longer life. One size and type serves all purposes in the foundry—does *all* your sifting more quickly and economically.

It is easily handled by one man, weighs approx. 90 lbs., is 62 in. high overall. The one-piece frame of tough aluminum alloy makes for a remarkably effective vibration. Its smooth, free, rotary action vastly increases bearing life; all bearings grease packed. All mechanism of the ROTOPLANE is *completely* enclosed—no bearings or activating parts of any kind exposed to dust and grit.

The Quick-Change Sieves are instantly interchangeable, mounted in smooth, flat steel ferrule, with 20-inch diameter clear sifting area. No jagged edges to tear workers' hands, no storage problem.

$245.00 f.o.b. Chicago—complete with cable, safety ground wire. Standard 1/3 h. p. motor, 110 volt, 60 cycle, single phase and 220 volt, 1 or 3 phase.

UNIVERSAL FREE - WHEELING RIDDLE equipped with motor as above $225.00



RED ELECTRIC VIBRATORS

True-to-pattern castings make satisfied customers . . . more repeat business. Increase your production and castings quality with RED Electric Vibrators. Sturdy, dustproof, lowest operating cost (electricity does not freeze). Unequaled for consistent year-'round results in foundries all over the world.

(All Prices f.o.b. Chicago)

No. 1—Light match plate work	$11.00
No. 2—Medium match plate work	13.00
No. 5—Heavy match plate, tub and bench work	17.00
No. 9—Machine and heavier work	26.80

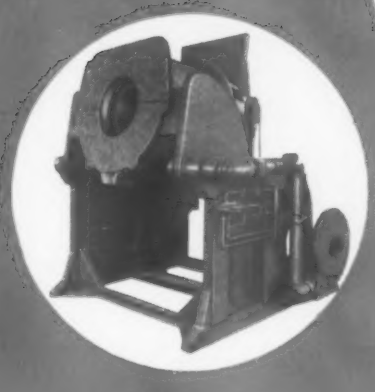
Third (ground) wire per U. S. Gort. code—furnished with No. 9 at no extra cost; $1.20 extra with Nos. 1, 2 and 5 vibrators.

KNEE SWITCHES for operating Red Electric Vibrators:
Single pole $5.00, Double pole $6.50.

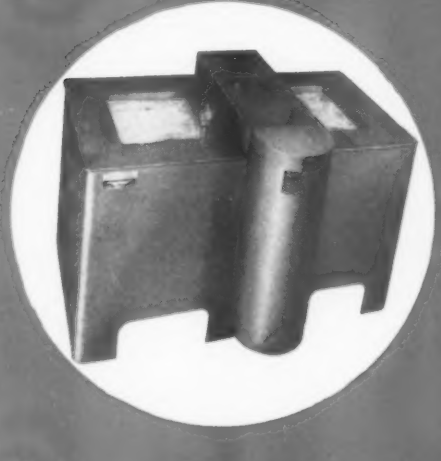
FOUNDRY SUPPLIES MANUFACTURING CO.

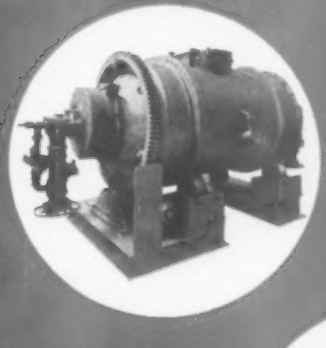
2221 Orchard Street **Chicago, Illinois**

CABLE ADDRESS: "ROTOPLANE CHICAGO"

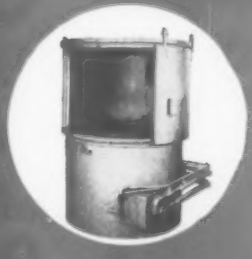


MELTING AND HOLDING FURNACES





Lindberg-Fisher builds all kinds of melting and holding equipment . . . gas . . . oil . . . electric . . . induction . . . arc and high frequency. Lindberg-Fisher engineers can intelligently and without prejudice recommend the proper type of furnace to best suit your needs and conditions.



Bulletin 551 covers the complete melting line. Write for your copy today.

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Quantity PRODUCTION *of* GREY IRON CASTINGS

ONE OF THE NATION'S LARGEST AND MOST MODERN PRODUCTION FOUNDRIES

ESTABLISHED 1866

THE WHELAND COMPANY

FOUNDRY DIVISION

MAIN OFFICE AND MANUFACTURING PLANTS

CHATTANOOGA 2, TENNESSEE

How True!
Mr. Taylor, How True!

Frederick Winslow Taylor, the father of Scientific Management, taught that scientific management is a continuing, never-ending task. The job is never finished. Like a plant or a shrub or a tree it must be planted and cultivated, and shaped and pruned. To help you grow a tree of production efficiency that will bear the fruits of bigger savings, lower costs, and higher quality . . . this is the basic philosophy of AMERICAN engineering . . . this is the dominant idea behind each product we build.

WORTHINGTON PUMP FINDS . . .

". . . Dustubes are the best investment we have ever made"

Mr. C. Schwalje,
Superintendent of Foundries

"Foundry dust is not only expensive but also troublesome — a source of discontent and irritation. Fortunately our own foundry is relatively free of dust, especially in the various cleaning rooms in which Dustubes are utilized. On this basis alone, **our Dustubes are the best investments we have ever made.** ***In addition, their efficiency and cost-saving performance return direct cash savings which will pay us a profit for many years to come."***

Mr. Les Young, Superintendent of Foundry Maintenance

"As far as our crew is concerned, any machine is no better than the amount of maintenance it requires for the job it performs. On this score the Dustube rates tops — there is no maintenance except for occasional inspections. The simple, efficient operation of the collectors enables us to save both hours and dollars in maintenance costs."

American DUSTUBE COLLECTORS

"An investment that brings many returns" is the way Worthington Pump and Machinery Corp., Harrison, N. J. considers their three Dustube Collectors. Here's why: the simplicity of Dustube's design results in lower operating and maintenance costs, and their high efficiency in trapping dust keeps men and machines more productive. For complete details write for Catalog 72-A.

American WHEELABRATOR & EQUIPMENT CORP.
505 S. BURRIT ST. MISHAWAKA 2, INDIANA

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WHEELABRATOR®

MONORAIL CABINET

CASE HISTORY No. 13

PLEASE TURN PAGE

pays for itself within two years

at SUPERIOR FOUNDRY Inc., (Cleveland)

By installing a Wheelabrator Monorail Cabinet, Superior Foundry, Inc. of Cleveland, Ohio has saved 15,000 man-hours yearly in the cleaning department, cleaning time has been decreased 50% and the cost of repair parts has been reduced 40%.

Superior Foundry, Inc. is a semi-production foundry that specializes in alloyed gray iron castings for such industries as automotive, home heating, refrigeration, and machine tools.

Prior to the installation of the Wheelabrator Cabinet, this plant was equipped with three tumbling barrels and two 14′ Plain Blast Tables for cleaning large, heavy castings. Cleaning costs were sky-high, cleaning quality left much to be desired and shipping schedules were rarely met due to serious delays in the cleaning room.

When their first Wheelabrator . . . a 48″ x 48″ Tumblast . . . was installed to replace an old airblast mill, the management was gratified by its fast, thorough, low-cost performance. This led the way to a study of the entire cleaning room operation and dramatized the need for a Wheelabrator high-production unit. An investigation of various Wheelabrator Cabinet installations in local foundries clinched their decision to install similar equipment.

The Wheelabrator Monorail Cabinet, now installed, has been extremely satisfactory, both as to cleaning production and cleaning quality. Castings are indexed in front of each of the 4 Wheelabrator units for one minute. Even the most intricate cored castings are thoroughly cleaned in this time. Work hangers of special shapes and types have been designed to accommodate their castings which range from 5 lbs. to 600 lbs. each. A production of approximately 10 tons per hour is maintained when the flow of work to the machine is constant.

This Case History is one of a series which we have been citing regularly in this magazine to prove that Wheelabrators can be installed with the assurance that they will effect important savings in any shop, large or small. In most cases within our experience these savings are sufficient to return the investment within 6 to 18 months. Why not check to see if the Wheelabrator can do the same for you? We will gladly assist in making this investigation by means of actual cleaning tests and specific data pertinent to your individual problems. There is no obligation, of course.

	FORMER METHOD	WHEELABRATOR METHOD
MACHINES	3 Tumbling Mills 2 Blast Tables (14′ dia.)	Special Monorail Cabinet with 4 Wheelabrator Units
PRODUCTION	1600 tons per month	1600 tons per month
LABOR REQUIREMENT	Operating: 12 men x 8 hours = 96 man hours daily Maintenance: 4 men x 8 hours = 32 man hours daily	Operating: 5 men x 8 hours = 40 man hours daily Maintenance: 1 man x 8 hours = 8 man hours daily

SAVINGS

OPERATING LABOR
15,000
MAN HOURS ANNUALLY

MAINTENANCE LABOR
6,000
MAN HOURS ANNUALLY

REPAIR PARTS CUT
40%

CLEANING TIME CUT
50%

Savings sufficient to pay for complete installation within two years.

American WHEELABRATOR & EQUIPMENT CORP.
505 S. Byrkit St. Mishawaka 2, Indiana

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

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TRU-STEEL SHOT LASTS LONGER

Saves $1.09 per wheel hour for an Ohio Tool Manufacturer †

By replacing Chilled Iron Shot with TRU-STEEL this customer saved 62% on the cost of shot and machine parts, as shown in the chart below.* Like many other manufacturers, they found that TRU-STEEL shot lasts many times longer than chilled iron because it wears down slowly without breaking down.

TRU-STEEL Shot is genuine true steel that has received a full heat treatment — not just a draw or anneal. It is round and solid, hard and tough, accurately graded and controlled as to quality and hardness. A test will show you how much you can save. Write today for Bulletin No. 59.

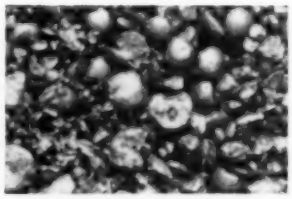
†Name on request.

LIFE COMPARISON - TRU-STEEL vs. CHILLED IRON SHOT

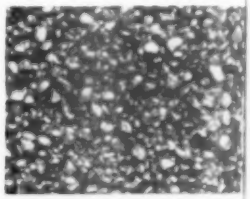
Showing relative break-down after a given number of passes through a centrifugal blasting wheel.

CHILLED IRON
No. 230 at Mag. 10X

NEW SHOT

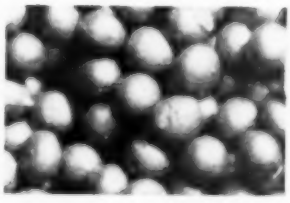


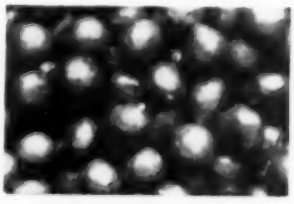
AFTER 50 PASSES

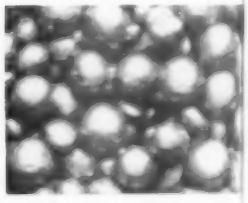


AFTER 1500 PASSES

TRU-STEEL
No. 230 at Mag. 10X







PERFORMANCE CHARACTERISTICS

1. Cleans as fast—or faster—than chilled iron shot.
2. Reduces machine maintenance costs.
3. Increases life of machine parts.
4. Lasts many times longer than chilled iron shot.
5. Saves storage space and transportation costs.
6. Reduces cleaning costs per ton.

*COST COMPARISON CHART

TYPE OF SHOT	CHILLED IRON	TRU-STEEL
Shot Used in 80 Wheel hours	1950 lbs. (24.4 lbs. per Wheel Hour)	400 lbs. (5 lbs. per Wheel Hour)
Cost of Shot	$87.00	$45.00
Cost of Parts	$52.65	$ 6.80
Total Cost	$139.65	$51.80
SAVINGS	(80 Wheel Hours)	**$87.85**

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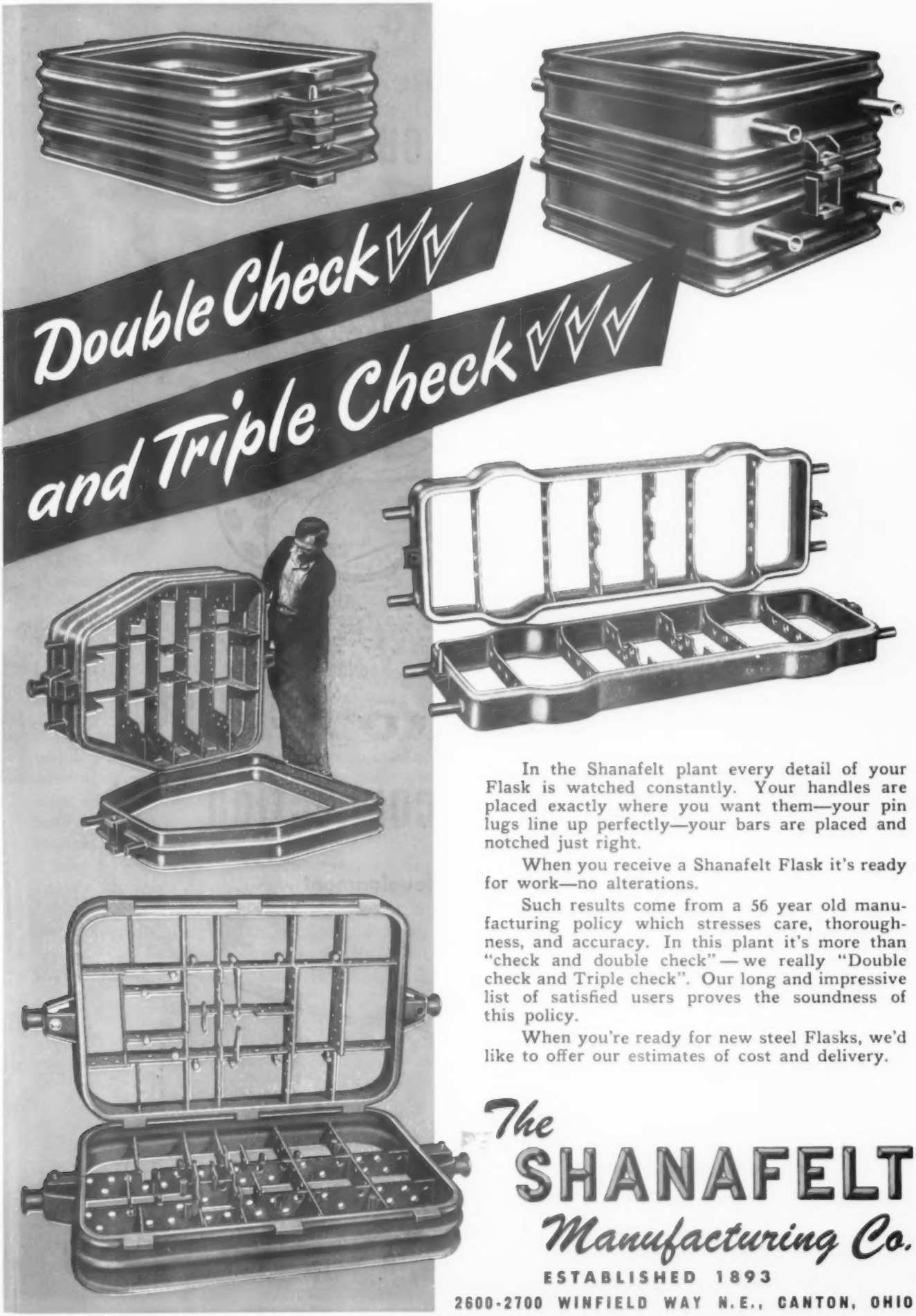
American WHEELABRATOR & EQUIPMENT CORP.
605 S. BYRKIT ST. MISHAWAKA 2, INDIANA



In the Shanafelt plant every detail of your Flask is watched constantly. Your handles are placed exactly where you want them—your pin lugs line up perfectly—your bars are placed and notched just right.

When you receive a Shanafelt Flask it's ready for work—no alterations.

Such results come from a 56 year old manufacturing policy which stresses care, thoroughness, and accuracy. In this plant it's more than "check and double check"—we really "Double check and Triple check". Our long and impressive list of satisfied users proves the soundness of this policy.

When you're ready for new steel Flasks, we'd like to offer our estimates of cost and delivery.

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SHANAFELT
Manufacturing Co.

ESTABLISHED 1893

2600-2700 WINFIELD WAY N.E., CANTON, OHIO

shunts can't come out of USG brushes

with STATITE... the first

(PATENT APPLIED FOR)

permanent shunt connection

STATITE . . . the most outstanding development in the last 25 years!

- **Cannot be jarred loose or pulled out.**
- **Cannot oxidize.**
- **Unaffected by extreme temperature.**
- **Maintains original low shunt drop.**

Write today for complete information on STATITE.

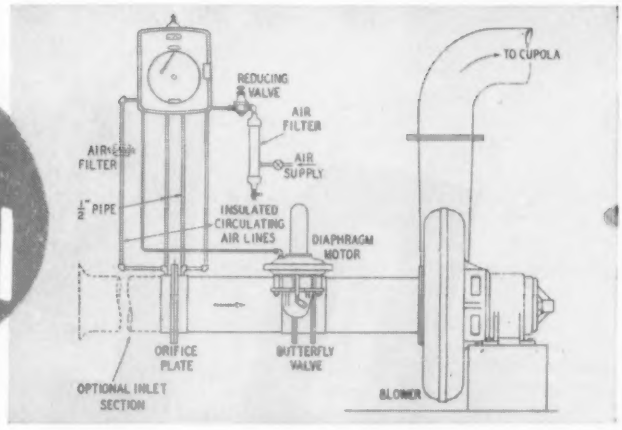
THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION, SAGINAW, MICHIGAN

Save Pigging · Save Fuel · Save Rejects

with this

New, Improved Air-weight Control



This is a typical installation set-up of Foxboro Air-Weight Control . . . readily adaptable to either a centrifugal blower (shown in diagram) or a positive displacement blower.

You can get these timely savings through cupola blast that's fully compensated for *every change* in atmospheric temperature and pressure. The right amount of oxygen for the quantity of coke charge assures better combustion, more uniform heats, better quality castings and lower costs.

Foxboro Air-Weight Controllers automatically control cupola blast by *weight of air* instead of volume. They are one of Foxboro's many original developments in instrumentation to cut industrial costs. Representative installations will be found throughout the foundry industry. The names of those located nearest you will be gladly sent on request.

Now . . . you can make the most of modern foundry practice by installing advanced-design air-weight control by Foxboro. Installation is easy and fast. Results will far outweigh the modest investment required. Write for complete details. **The Foxboro Company, 32 Neponset Avenue, Foxboro, Mass., U.S.A.** Branches in principal cities.

Here's the new Model-40 Air Weight Controller. Available for either yoke or flush mounting. Flush mounting permits combination with wind box Pressure Recorder and other cupola instruments on central panel.

FOXBORO REG. U. S. PAT. OFF. **AIR-WEIGHT CONTROLLERS**

FOR FASTER PRODUCTION OF

DELTA

Scientifically Developed

SPECIALIZED FOUNDRY PRODUCTS

DELTA PRODUCTS for the FOUNDRY are PRODUCTS OF RESEARCH. During the past sixteen years many important scientific developments . . . valuable contributions to the advancement of foundry practices . . . have originated in DELTA'S laboratories where the most modern scientific facilities play a vital part in a continuing program of product research, development and standardization.

Every DELTA Foundry Product is first tested by laboratory methods and then submitted for use and final approval in ACTUAL FOUNDRY PRACTICE. before it is identified with the name "DELTA".

There is no "just as good" substitute for any DELTA Core and Mold Wash just as there is no substitute for DELTA'S scientific laboratory control of production which safeguards the quality and uniformity of all DELTA Foundry Products. DELTA Research laboratories developed, and pioneered the use of, Plastic-type Core and Mold Washes . . . and still leads the field in the development of new products for improved foundry practices.

VISIT US AT OUR BOOTH—NUMBER 328

54th ANNUAL A. F. S. FOUNDRY CONGRESS & SHOW • CLEVELAND, MAY 8-12, 1950

DELTA OIL PRODUCTS CO.

FINER-FINISH CASTINGS AT *Lower Cost*

Delta Technical Men will be at the booth to answer your questions and discuss with you problems relative to foundry practice. Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

CORE AND MOLD WASHES:

FOR STEEL:

Delta Special Core & Mold Wash Base — Used by more steel foundries than all other types of washes combined.
Delta SteelKoat, a finished high fusion waterproof wash.

FOR ALL TYPES OF SAND CAST METALS:

Delta ThermoKoat — It's plasti-lastic, non-heat shocking, highest fusion and hot strength.
Delta Z-Koat, a zirconium wash with unusual properties in contact with molten metal.

FOR GRAY IRON, MALLEABLE, BRONZE AND BRASS:

Delta GraKoat, no reaction with molten metal.
Delta BlacKoat, a black wash, free from carbon, no gas in contact with molten metal.

FOR GRAY IRON:

Delta BlacKoat S-5, a new and different wash. Produces results, on gray iron castings, unequalled by any other wash.

FOR NON-FERROUS AND LIGHT METALS:

Delta NonferrusKoat, produces unusually smooth surface castings.

PARTING COMPOUNDS:

Delta Partex (Nutshell partings) has lycopodium properties, non-injurious and non-hazardous to use.

Delta Liquid Parting — Low cost, highly effective and lasting.

Delta Sand Conditioning Oil — Sticking core sand mixes work freely in core boxes when sand conditioning oil is added to core sand mixes.

MUDDING & PATCHING COMPOUNDS:

Delta Sliktite — A light colored mud for all types of metal castings.

Delta Ebony — A black mud for gray iron, malleable and nonferrous work. All mudding compounds seal core joints and hold joints together at high temperatures.

NO-VEIN COMPOUND:

A special compound, not iron oxide. A high hot strength and sand plasticizing material. Stops veins and penetration.

MOLD SURFACE BINDERS — LIQUID:

Delta Spray Binders — Produce dry sand mold results by surface spraying of green sand molds.

PERMI-BOND ELIMINATES SEA COAL NUISANCE:

The new modern scientific sea coal replacement.

BONDITE PRODUCES A REDUCING MOLD ATMOSPHERE:

For Steel and Gray Iron — Use Delta Bondite, a dry binder which becomes waterproof on drying and produces mold atmosphere which is high in reducing gas.

CORE ROD DIP OIL NO. 224X TIES CORE RODS AND WIRES INTO THE CORES:

Rods and wires coated with Delta Core Rod Dip Oil adhere to the sand. Eliminates need for 50% of the rods and wires and reduces core breakage.

CORE OILS:

High tensile, low gas, faster baking, exceptionally economical to use.

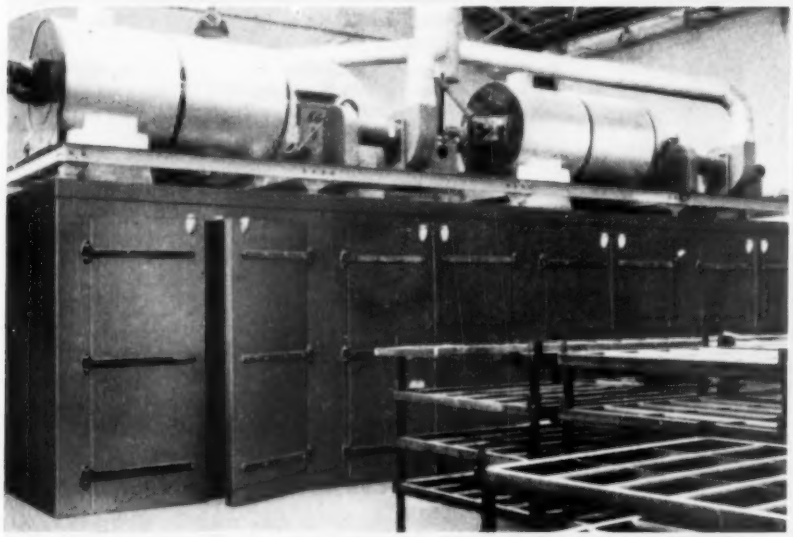
DRI-BOND:

A new type of Dry Binder which provides new economies. Fast-baking, reduces veining and penetration. Can be used with old sand equally as well as with new sand.

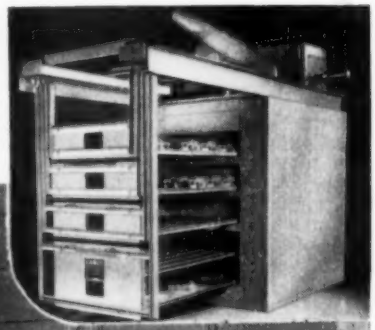
MILWAUKEE 9, WISCONSIN

LANLY CORE AND MOLD OVENS

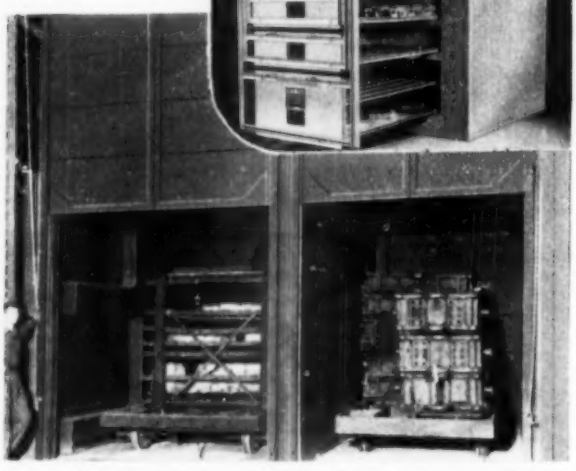
Thoroughly Proved For All Foundry Operations



A four-unit rack-type oven with each compartment individually heated.



An improved drawer-type oven. Each drawer is suspended on ball bearing trolleys and can be opened independently without jar or vibration.



A typical Lanly car type mold drying oven. Each compartment is individually heated and controlled.

The wide range of operations handled—the varying sizes and capacities of equipment—the high calibre of purchasers and the impressive number of repeat orders—all give convincing assurance of Lanly ability as designers and builders of foundry ovens.

Lanly experience covers standard ovens of the popular types, combination ovens, conveyor ovens, complete oven systems and units of various sizes and types for special operations.

Many Lanly ovens equipped for dual firing and quick change-over from gas to oil, or vice versa, were doubtless greatly appreciated during the coal shortage which curtailed gas for industrial use in many localities.

Lanly consultation and advice are available without obligation. A new catalog is also available.

THE LANLY CO.

OVENS FOR INDUSTRY

HEATED BY GAS, OIL, ELECTRICITY OR STEAM

780 PROSPECT AVENUE CLEVELAND, OHIO

The LANLY Co.
Cleveland, Ohio

☐ Send information regarding Foundry Ovens.

Company .....

Address ..... By .....

Rotor's 15 New "Multi-power" Chippers are easier to handle . . . do jobs faster

The unique hollow piston and "doughnut" valve of the 15 new Rotor "Multi-power" Chipping Hammers provide the 1-2 punch to cut your chipping costs.

Lighter Weight. These new Rotor Chippers average 1½ to 2 lbs. lighter than other chippers making them easier to handle.

Shorter. Exclusive "doughnut" valve makes possible saving of 1″ to 2″ in length, making it easier to get into those tough, crowded corners.

Faster Cutting. You get more blows per minute . . . because of new exclusive design.

3 Models in 1. By a simple change of parts you can adapt each of the 5 basic models to serve as 3 hammers to match your job: (1) A "regular" model, (2) A "super-speed" model, (3) A "super-sock" model.

This is the biggest advancement in chipping hammers in the past 15 years! Find out all about it! Write for catalogue No. 37.

AIR O'TOOL

a *NEW* money saver for the foundry . . . .

HARBISON-WALKER

Refractory STRAINER CORE *Shapes*

Refractory Strainers reduce the number rejected castings, by preventing the entrance of inclusions into the mold. They do not crack, spall or erode during pouring.

By reducing rejects caused by "slag" carried into the mold, Harbison-Walker refractory Strainer Core Shapes have proved their worth as a money-saving improvement in modern foundry practice. There is no spalling or erosion of these hard fired strainers, for they are made of high-strength, low thermal expansion ceramic materials. They serve to reduce losses of metal and to insure a higher production of acceptable castings.

- Made in seven sizes, having open areas the equivalent of stream diameters, from $\frac{5}{8}$ to $1\frac{1}{2}$ inches.
- Require no change in present molding practice. Packed for convenient handling.
- Now are used by some of the country's largest foundries in regular production work.

Convenient Carton Trays

Harbison-Walker Refractory Strainer Core Shapes are packed in carton trays for convenience and speedy handling on the molding floor. Available for prompt shipment of sizes most commonly used.

HARBISON-WALKER REFRACTORIES CO.
Pittsburgh 22, Pennsylvania

Please send me complete data on Refractory Strainer Core Shapes.

Name_____
Title_____
Company_____
Address_____

HARBISON-WALKER REFRACTORIES COMPANY
AND SUBSIDIARIES
WORLD'S LARGEST PRODUCERS OF REFRACTORIES
General Offices: PITTSBURGH 22, PENNA.

Advertisement

ELECTROMET Data Sheet

A Digest of the Production, Properties, and Uses of Steels and Other Metals

Published by Electro Metallurgical Division, Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. • In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

How CHROMIUM and TUNGSTEN Increase Strength of High-Temperature Alloys

The aircraft field has served as an important "proving ground" for the high-temperature alloys that have been developed for gas turbines required to operate at elevated temperatures. However, these alloys are now demonstrating their superior properties for other primary power applications, including gas turbines to operate electrical generators for stationary or motive power.

While there are literally dozens of different alloys available for high-temperature use, most of them contain the alloying elements chromium and tungsten for the express purpose of enhancing resistance to scaling and increasing their hardness and strength at elevated temperatures. The amount used is generally determined by the stresses and temperatures expected in service. Other alloying metals may also be added for special purposes — such as columbium, manganese, silicon, and titanium.

Chromium and Tungsten as Strength-Builders

Even small amounts of chromium and tungsten are effective in increasing the strength of high-temperature alloys. An important consideration is, of course, the exposure time—particularly when operating temperatures go above 1200 degrees Fahrenheit. Although the major role of chromium is to prevent scaling, it has been found that chromium, as well as tungsten, also helps the alloys to maintain their strength when they are exposed to high temperatures for long periods of time.

In addition to chromium and tungsten, the combination of other alloying metals present will likewise influence the strength of the alloys. Heat-treatment, too, will influence the properties of these materials. However, in obtaining the higher ranges of strength needed at extremely high temperatures, chromium and tungsten are essential.

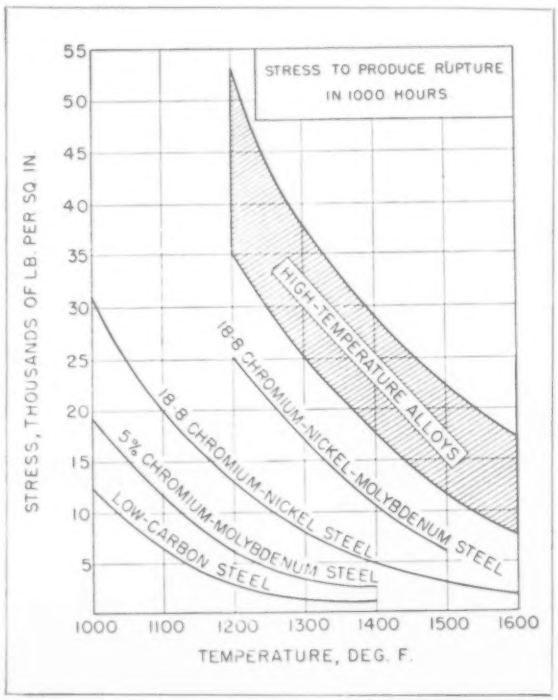


Fig. 1—Here is the average range of strength of various high-temperature alloys compared with other metals.

Where High-Temperature Alloys Are Used

Special high-temperature alloys containing chromium and tungsten are being used for the construction of gas turbines that power railroad locomotives, ships, airplanes, and electric generating plants. Some typical parts made of these alloys are rotors, turbine blades, nozzle vanes, ducts, and housings. These parts are exposed to temperatures of from 1200 to 1500 degrees Fahrenheit.

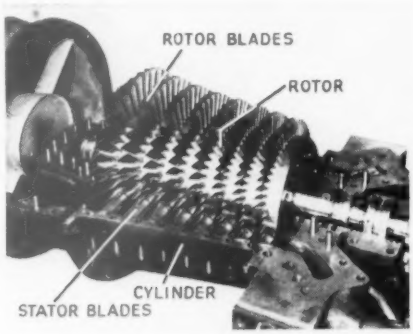


Fig. 2—Rotor and stator blades in this locomotive-type gas turbine are precision-cast of an alloy containing about 24 per cent chromium and 6 per cent tungsten. The rotor body and cylinder housing are forged from an alloy containing about 19 per cent chromium and 1.2 per cent tungsten.

If You Need Technical Help

Those producing high-temperature alloys who wish technical help in the selection of alloying metals will find ELECTROMET's metallurgists glad to cooperate. In addition to chromium and tungsten alloys, ELECTROMET also produces ferro-alloys of columbium, manganese, silicon, and titanium for use in making high-temperature alloys. If you wish further information about the properties and uses of these alloys, write to the nearest ELECTROMET office.

Ask for our new catalog "Electromet Ferro-Alloys and Metals." It describes over 50 metals and alloys produced by ELECTROMET and tells of the unique technical service offered to the metal industries.

The term "Electromet" is a registered trademark of Union Carbide and Carbon Corporation.

...always a fast, even heat
...like INTERNATIONAL GRAPHITE ELECTRODES

ICE International GRAPHITE AND ELECTRODE CORP.
ST. MARYS, PA.

6261

NEW

CONTROLLED-POWER CHIPPING HAMMER

selected to fit operator's preference enabled him

to produce

184% additional work . . .

. . . when tested

against hammer picked at random from production floor

These new hammers enable the operators to produce more with less effort.

Controlled-Power Chipping Hammers provide added power under "stalled-cut" conditions . . . they eliminate valve choking and short-stroking of pistons . . . they provide smooth power, automatically responding to the demand for more air . . . they give immediate starting with full power . . . they permit smooth, graduated cutting . . . *they give you a selection of 15 power sizes where formerly you had only 5.*

Let us arrange a similar test in your shop, under your conditions and with the metals you are chipping. The results will enable you to determine what hammer replacements will be profitable.

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y. 482-B

TEST DATA*

The new size E2A Controlled-Power Hammer was tested against three comparable 2″ Stroke Hammers currently in use in customers plants. All tests were made with 85 lbs. air pressure at the tools and for a duration of 30 seconds.

Test No. 1

E2A Controlled Power Hammer Serial 907	2.45 oz.
2″ Stroke Hammer (Brand New) Serial 109,534	1.84 oz.
Gain	.61 oz. or 33%

Test No. 2

E2A Controlled Power Hammer Serial 907	2.45 oz.
2″ Stroke Hammer Serial 54272 (Selected as above average)	1.24 oz.
Gain	1.21 oz. or 97%

Test No. 3

E2A Controlled Power Hammer Serial 907	2.45 oz.
2″ Stroke Hammer Serial 64099 (Picked at random by customer)	.86 oz.
Gain	1.59 oz. or 184%

Test No. 3 indicates nearly 3 times as much chipping by the New Controlled-Power Hammer! . . . or a phenomenal 184% additional work against the hammer picked at random from the customers production floor.

The "pay-off" time for new hammers as developed by the tests would be as follows

Cost of the man—$1.30 per hr. x 8 hrs. = $10.40 per day

184% *additional* work represents $19.14 in *additional* production.

The New Controlled-Power Hammer costs $85.00 each.

$\frac{\$85.00}{\$19.14}$ = 4.44 days or 35.52 hours pay-off time!

Actually less than 40 hours to pay off the cost of the new labor-aiding, time-saving machines.

A similar test can be made in your shop to determine the savings that can be made. Fill out the coupon and mail it today.

INGERSOLL-RAND CO. DEPT. P.T.
11 Broadway, New York 4, N. Y.

Gentlemen: We are interested in cutting our chipping costs and making the operator's job easier.

☐ Send descriptive folder on new Controlled Power Hammer.

☐ Would like to discuss details of making a test in our shops.

Name_____

Company_____

Address_____

City_____ State_____

it's NEW

it's MORE COMFORTABLE

it's RUGGED

Heavy Duty Glove

AO 5X264

Feel it, test it, wear it and you'll see why this latest addition to the AO steel stapled line is ideal for handling small castings, rough stock, grinding and similar work.

Made of specially treated chrome tanned cowhide leather for long wear, the glove features a canvas back with elastic strap to overcome hand fatigue while providing a cooler feeling and snug fit.

All seams are steel sewed and the seam along the forefinger has been eliminated for longer glove life and added comfort at this vulnerable point.

Wearing surface of the palm has also been increased by extending the palm — no bib patch — another comfort feature.

The steel stapled strap at the thumb crotch fortifies one of the weakest parts of a glove. There is a steel stapled patch on face of thumb and a short cufflex cuff with tape binding.

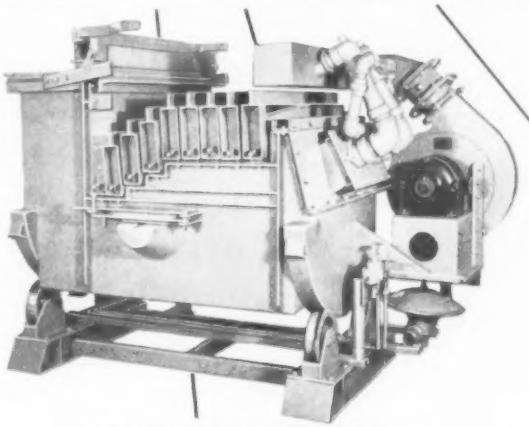
You'll lower your glove costs with the 5X264 — ask your AO Safety Representative or inquire at your nearest AO Branch Office.

American Optical Company
Safety Division

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

4 WAYS TO *Greater Profits*
...FASTER MELTING
...BETTER SHOP CONDITIONS!

These four leading Stroman Furnaces are merely a part of the tremendous complete line of furnaces that Stroman makes for use in Foundries, Die Casting, Permanent Mold and Sand Casting Plants. Remember . . . Stroman builds any type or size furnace for any or all size melting problems. Each type furnace does its job exceptionally well, assuring lowest fuel costs, easiest operation, fastest melting and longest life. They are the furnaces you should consider above all others, for they are the acknowledged leaders in the field. Send your melting room problems to Stroman today . . . their engineers, who are qualified experts in melting room procedure and layout, will be only too glad to consult with you and offer suggestions for improvements and savings.



ECONOMELT FURNACES

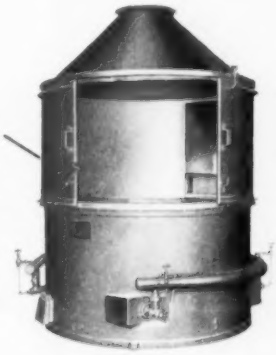
The finest direct fired reverberatory melting furnace ever offered. Melting speed for Brass, Bronze, Grey Iron or Aluminum is unmatched. Continuous charging. Cold metal does not reach the molten bath causing it to chill. All metal is preheated and melts in suspension. This furnace shows upward of 40% savings in fuel costs. Oil, gas or combination oil-gas fire. Capacities (Brass or Iron) up to 6000 lbs. Write for Bulletin 635 giving full information.

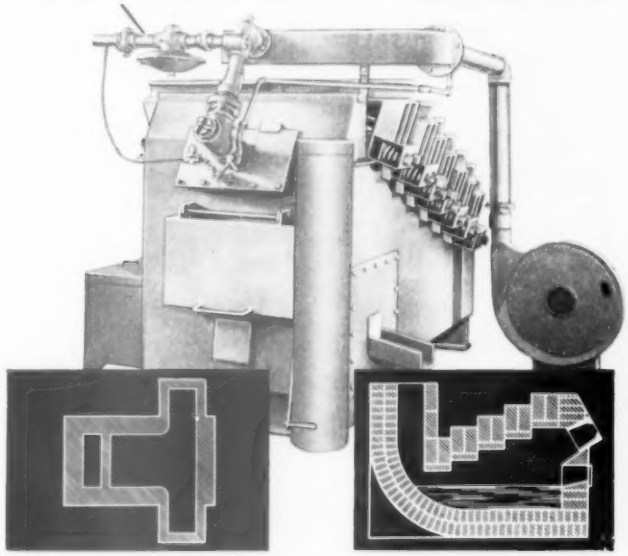
STROMAN RM STATIONARY CRUCIBLE MELTING AND HOLDING FURNACES FOR ALUMINUM

Built especially for use in permanent mold and die casting plants where molten metal is dipped from furnace with a hand ladle. Melting is done in crucible (no iron pick-up). Thoroughly insulated to protect the operator from heat. Oil, gas or combination oil-gas fire. Capacities, 200 to 800 lbs. Available with full automatic controls.

STROMAN IRON POT MELTING FURNACES FOR ZINC OR ALUMINUM

These furnaces are highly recommended as breakdown furnaces for zinc and aluminum die casting and permanent mold plants. They also excel as holding furnaces. They can be supplied either with or without hoods to exhaust fumes and heat. Their construction assures longest pot life and lowest fuel costs. Choice of automatic or manual controls and oil or gas fire. Capacities from 212 to 14,000 lbs. zinc.





Horizontal view showing 2 dip-out boxes.

Vertical view showing combustion chamber, metal bath, charging hopper and clean out door.

STROMAN MODEL MC ALUMINUM REVERBERATORY DIP-OUT FURNACE

It's New! Continuous charging and pouring make it without equal in low fuel and maintenance costs plus quality castings. Two Stromans in one . . . the combination of breakdown and holding furnaces makes this the most economical furnace ever designed for aluminum melting. It can be used for melting, holding, alloying fluxing for either casting or producing ingots. Cold metal does not reach the molten bath. Hot metal is always available for dipping. No iron pots or crucibles to buy. Bath capacities range from 500 to 10,000 lbs. Oil, gas or combination oil-gas fire.

Write for Complete Information at Once

STROMAN FURNACE & ENGINEERING CO.

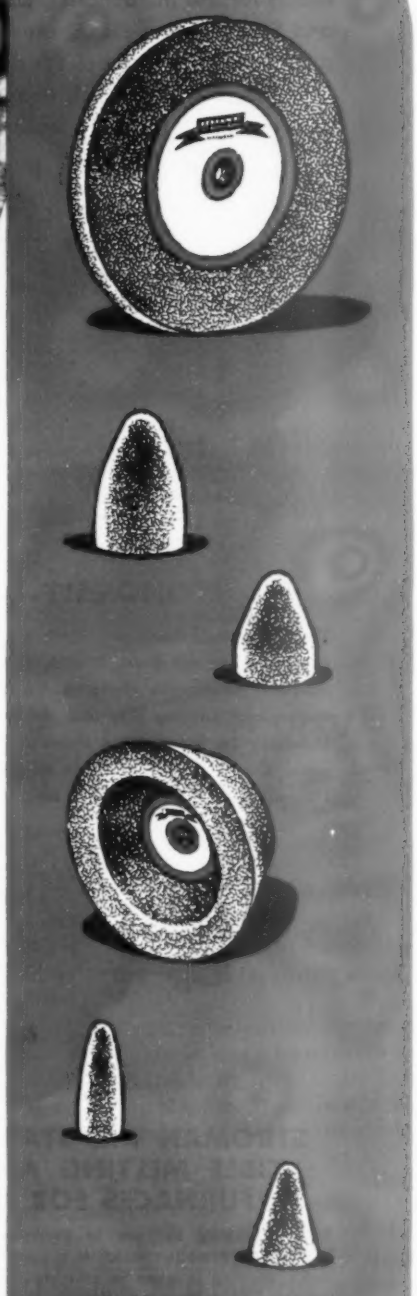
DIVISION OF

THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.

SIMONDS
ABRASIVE CO.

Grinding Wheels

"Clean-up" Savings in portable grinding



For grinding performance that shows up in real production economies, use Simonds Abrasive Grinding Wheels on all your portable grinders . . . electric, pneumatic or flexible shaft. On every job they're top performers . . . biting into the toughest metal . . . giving fast stock removal and lasting productive action under the most severe conditions of use. Straight wheels up to 10" diameter x 1½" thick . . . flaring type cup wheels up to 6" diameter . . . also cones, buzzers, pot bails of various sizes Resinoid bonded wheels for speeds up to 9500 s.f.p.m. . . . Vitrified bonded for speeds to 6500 s.f.p.m.

Let's send you bulletin ESA 62, together with the name of the Simonds Abrasive Distributor ready to serve you.

MEMBER OF THE GRINDING WHEEL INSTITUTE

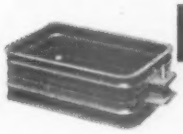
SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PA. DISTRIBUTORS IN PRINCIPAL CITIES

DIVISION OF SIMONDS SAW AND STEEL CO., FITCHBURG, MASS. OTHER SIMONDS COMPANIES: SIMONDS STEEL MILLS, LOCKPORT, N.Y., SIMONDS CANADA SAW CO., LTD., MONTREAL, QUE. AND SIMONDS CANADA ABRASIVE CO., LTD., ARVIDA, QUE.

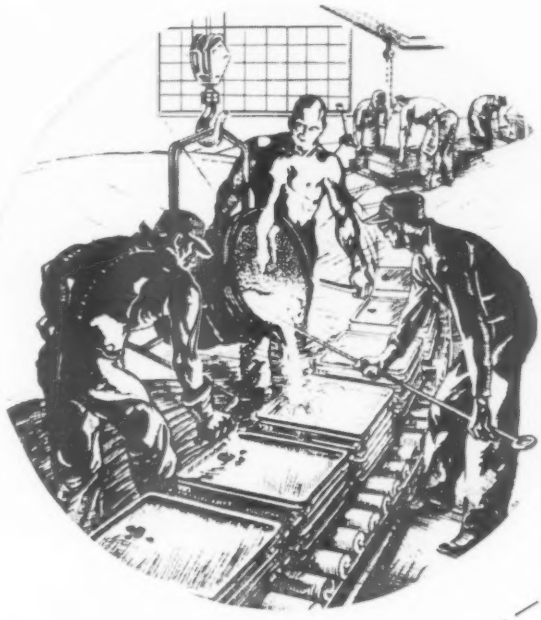
Truscon has the

technical service

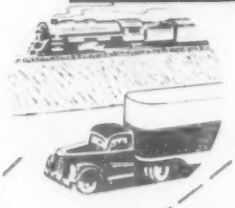
design



steel materials



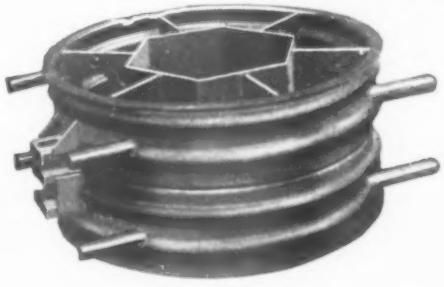
deliveries



you need in foundry flasks

Above:
Model TM-10
two man flask

Below:
Model TM-60
two man round flask



. . . and they all add up to *better production* for you!

Better production because Truscon Steel Flasks are efficient . . . are made to fit specific, individual foundry jobs.

Better production because Truscon Steel Flasks assure *continuous* production! They're made strong where strength is needed...made of rugged heavy gauge steel that wears as only steel can wear...month after month, year in, year out!

Truscon's prompt delivery service helps foundry production, too, because Truscon gets the flasks you need *where* you want them *when* you want them. Truscon men will be glad to work with you and for you to help select the right flasks for *your* particular jobs.

Send for Truscon's catalog complete with specifications and details on Truscon Steel Foundry Flasks.

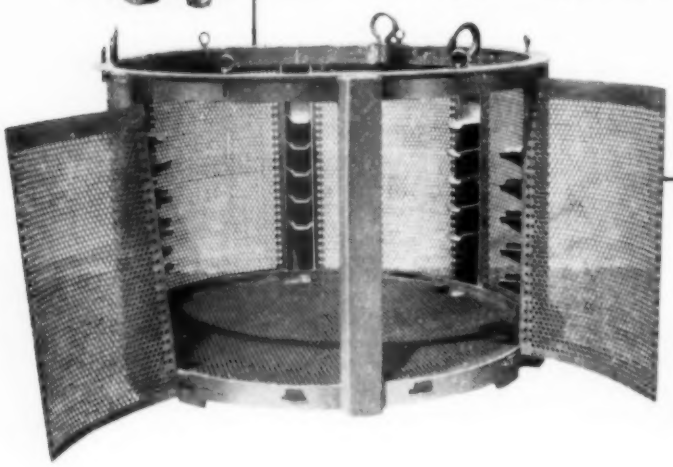
TRUSCON STEEL COMPANY
PRESSED STEEL DIVISION
6100 TRUSCON AVENUE • CLEVELAND 4, OHIO
SUBSIDIARY OF REPUBLIC STEEL CORPORATION

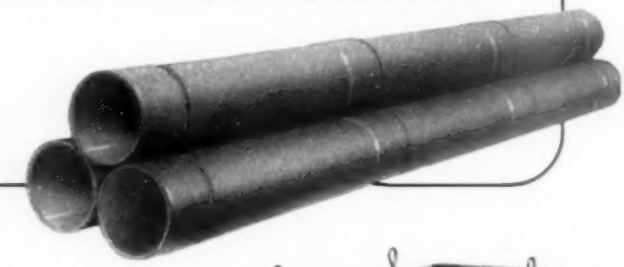
Cut Manual Handling Time

WITH *Light Weight*
PSC ANNEALING CONTAINERS

Because they weigh up to 2/3 less than cast containers, PSC welded alloy annealing units obviously handle much easier and faster. Let us show you how installations are effecting impressive savings in labor costs alone.

Left top, light-weight box with sand seal construction for bright annealing.
Left bottom, special basket for aircraft parts; movable sides and trays.
Right top, annealing tubes for steel mills. Only ¼" alloy; years of service.
Right bottom, combination annealing and pickling rack. Top braces removable.





In addition to the savings in handling time, PSC light-weight annealing containers effect four other substantial economies. First, being so much lighter in weight, they attain pot heat in less time; PSC installations have shortened heating cycles as much as 5 hours. Second, fuel savings; a recent study showed a $40 saving per anneal. Third, being less bulky, PSC units increase furnace capacity. Fourth, their much longer service life cuts replacement costs.

Standard and Special Types for Every Purpose

PSC welded alloy heat-treating equipment is furnished in any size, design or metal specification: annealing and carburizing boxes, covers, baskets, racks, tubes, retorts, etc. As a pioneer of welded alloy units, we offer a wealth of experienced engineering assistance. Send blue prints or write as to your needs.

THE PRESSED STEEL COMPANY
of WILKES-BARRE, PENNSYLVANIA

Industrial Equipment of Heat and Corrosion Resistant WEIGHT-SAVING *Sheet Alloys*

☆ ☆ ☆ OFFICES IN PRINCIPAL CITIES ☆ ☆ ☆

This Foundry is a Good Place to Work

Continental Foundry & Machine Company

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

CONTINENTAL operates three separate steel foundries at Coraopolis, Pennsylvania; East Chicago, Indiana; and Wheeling, West Virginia; producing a wide range of steel castings—from 20 pounds up to 250,000 pounds.

Facilities include eleven acid and basic open-hearths of from 25 to 75 ton capacity; car type annealing, normalizing, draw and tempering furnaces; oil tempering quench tanks; metallography equipment, physical and chemical laboratories, million volt X-ray equipment and two machine shops.

Continental is a good place to work because of these complete facilities which have given it an outstanding reputation for quality work . . . because of its progressive management policies . . . its engineering and design departments . . . and its continuing interest in employee welfare and safety.

Then, too, Herman molding machines help make it a good place to work. They're simple (one rotary valve handle controls their complete operation). They don't break down (careful engineering is combined with the best materials). Timing and lubrication are automatic . . . and the world over, Herman Molding Machines have made their way by the way they're made.

Herman MOLDING MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.

Complete Foundry
DUST AND FUME CONTROL

- SHAKE OUTS
- MOLD COOLING
- SAND HANDLING
- PATTERN SHOP

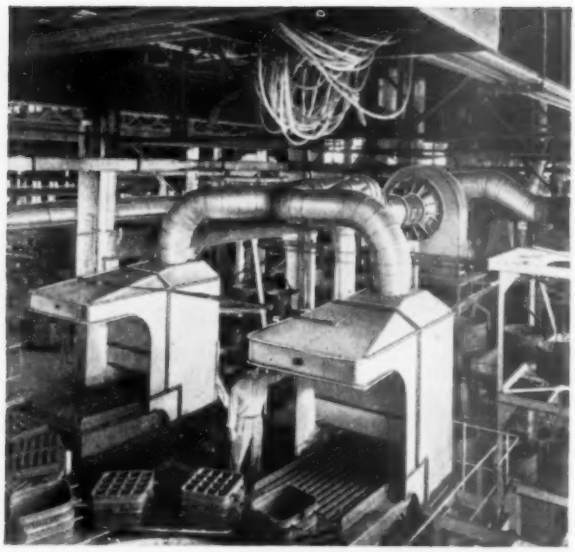
DESIGNED, FABRICATED, and INSTALLED BY KIRK & BLUM

From the pattern shop, where KIRK & BLUM Systems collect and store wood dust and shavings . . . to grinding and snagging operation, where other KIRK & BLUM Systems assure cleanliness and efficient working conditions—KIRK & BLUM has the right answer to every foundry dust and fume problem.

In shake out operations, notoriously one of the worst dust sources, KIRK & BLUM hood design and air application trap dust as it is released. Throughout the foundry, these systems assure maximum efficiency at minimum operating cost.

KIRK & BLUM Systems, in many of the nation's leading foundries, practically eliminate dust and fumes from traditionally "dirty" jobs. For unbiased recommendations, backed by more than 42 years of experience in all types of foundries, call on KIRK & BLUM. Write for the latest edition of Booklet M, "Dust Collecting Systems in Metal Industries." KIRK & BLUM Mfg. Co., 2808 Spring Grove Ave., Cincinnati 25, Ohio.

KIRK AND BLUM
DUST AND FUME CONTROL SYSTEMS

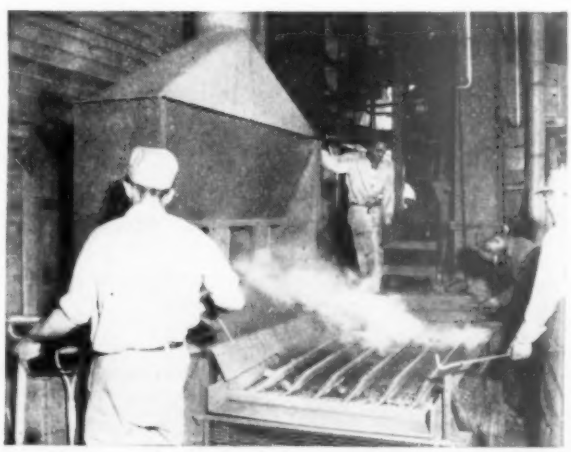


Dust control system on production line shake outs in a well-known midwestern foundry.

Dust control system on sand handling equipment, one of 17 KIRK & BLUM installations in a large Chicago foundry.

Unretouched photo shows shakeout hood in the Michigan foundry of an automotive parts producer.

In the plant of a leading cast radiation manufacturer, KIRK & BLUM System removes fumes, cools molds and removes dust.



SOMETHING DIFFERENT!

● SIMULTANEOUS JOLT SQUEEZE TURNOVER MOLDING MACHINE

● MECHANICAL BOX REMOVAL (No Hand Lifting) ● TABLE SIZE 51" x 36"

● CONVENIENTLY PLACED CONTROLS

Illustrated is the STONE-WALLWORK WT 562D machine with Simultaneous Jolt Squeeze, Turnover and Mechanical Mold Remover. This man is producing, unaided, half molds 42" x 42" x 6" at the rate of 20 per hour.

MADE IN ENGLAND

STONE-WALLWORK *Foundry Equipment*

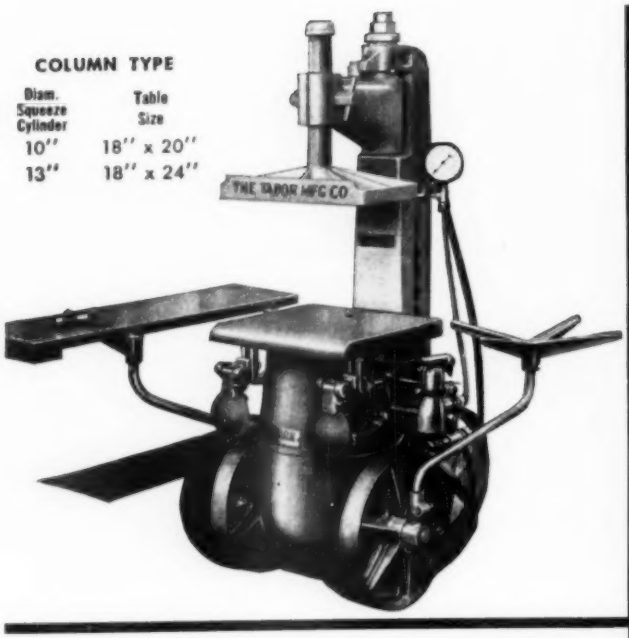
Stone-Wallwork equipment operates in 18 different countries. The range of products include complete mechanical plants, Push Button Controlled Molding Machines, and a special range of machines for operating in conjunction with the Sand-slinger unit.

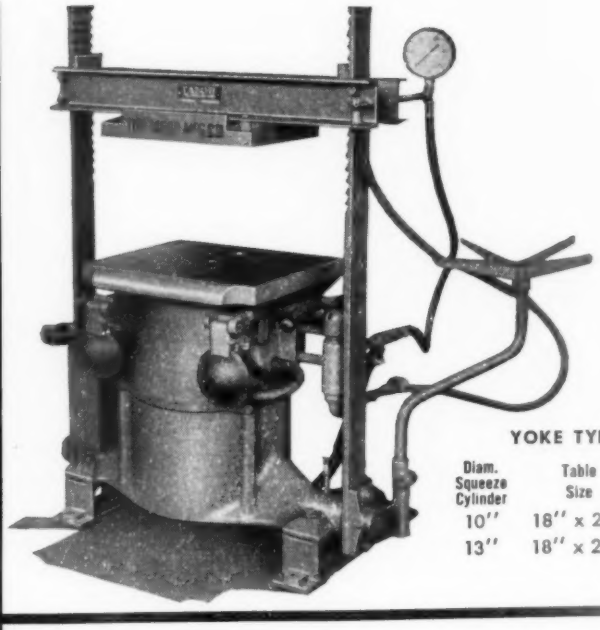
STONE-WALLWORK LTD., 121, VICTORIA STREET, LONDON, ENGLAND.

There's a Tabor Squeezer to fit the job!

COLUMN TYPE

Diam. Squeeze Cylinder	Table Size
10"	18" x 20"
13"	18" x 24"





YOKE TYPE

Diam. Squeeze Cylinder	Table Size	Space Between Uprights
10"	18" x 20"	32"
13"	18" x 24"	36"

TOP-SQUEEZE TYPE

Diam. Squeeze Cylinder	Table Size
10"	16" x 19"

(Also available in portable or portable sand-straddler types)

CANTILEVER TYPE

Diam. Squeeze Cylinder	Table Size
10"	18" x 20"
13"	18" x 24"

The **TABOR** *Manufacturing Co.*

SINCE **1884** MANUFACTURERS OF FOUNDRY MOLDING MACHINES

6225 TACONY STREET • PHILADELPHIA 35, PENNA.

MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

Dust Control At Foundry Shake-Out. "Buffalo" Static Air Washer in Background

DUST CONTROL MEANS PROFIT CONTROL WITH "Buffalo" EQUIPMENT IN THE FOUNDRY!

Clean air in the foundry promotes production, reduces waste and protects workers' health. These are some of the "profit" jobs "Buffalo" Air Washers are doing in foundries.

Specialists in industrial air handling, "Buffalo" engineers treat the problem of foundry air cleaning exactly as any other industrial air problem. Efficiency and ease of operation, low cost of operation and maintenance are of paramount importance on such jobs.

Why not investigate "Buffalo" Air Cleaning Equipment? Find out how economical it can be in *your* Foundry!

WRITE FOR BULLETIN 3181-A

"Buffalo" Air Washers are still built on the proven basic principles established by "Buffalo" fifty years ago, with many improved features added for easier installation and maintenance. In a complete range of combinations and sizes.

BUFFALO FORGE COMPANY

221 Mortimer Street **Buffalo, N. Y.**

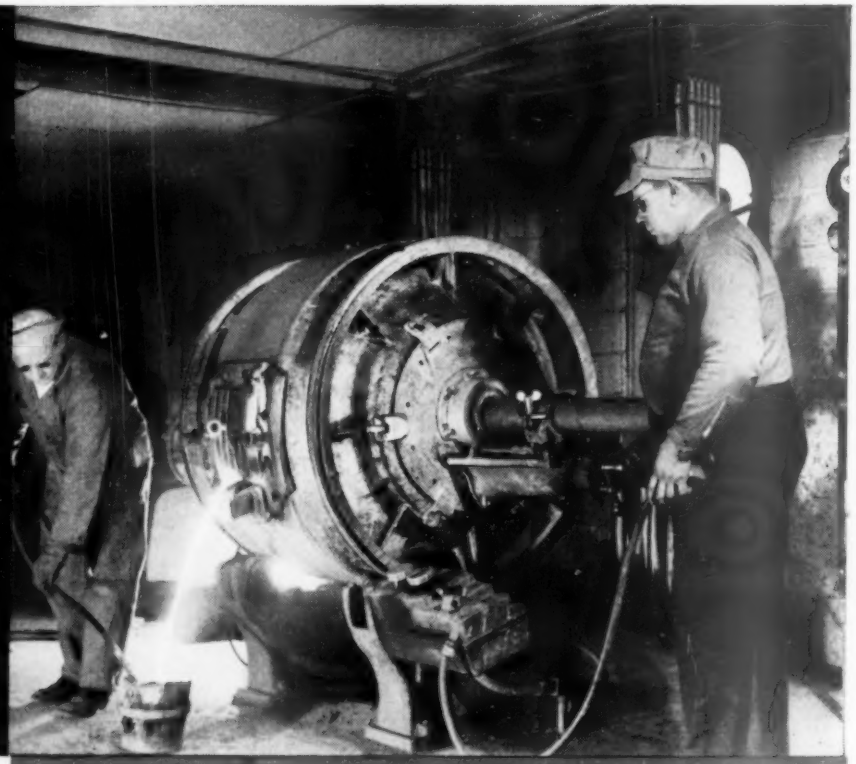
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Branch Offices in All Principal Cities

No pigs

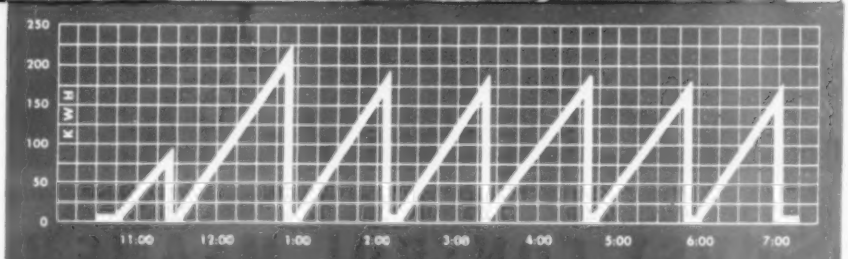
in 168,930 lbs. of synthetic alloy iron

A DETROIT ROCKING ELECTRIC FURNACE Melts Scrap with Economy and High Uniformity



No pigs were used in the production of 168,930 lbs. of uniform quality synthetic alloy iron by the Detroit Rocking Electric Furnace shown above. All charges were of scrap and graphite only.

Big savings were made on raw materials. Melt quality and homogeneity were rigidly maintained by automatic control.



One month's operation of type LFY, 175 KW, 700 lb. nominal cold charge capacity Detroit Rocking Electric Furnace. High strength, alloy automotive irons poured at 2800-3000° F.

• No. heats per day—7 • Av. heat weight—1000 lbs. • Total lbs. cold melted—168,930 • Av. power consumption, including preheat—549 KWH/ton • Total average cost for power, refractories, and electrodes, $11.41/ton.

NOTE: *Operator handles two such furnaces all day. Furnaces are equipped with automatic electrode control as well as automatic rocking control.*

Get Multiple Savings

In your melting operations, you'll achieve better castings, fewer rejects, higher usable yields with Detroit Rocking Electric Furnaces. Faster melts mean more heats per day.

Because the electrodes are always clear of the molten bath, carbon pick-up is eliminated. Indirect arc and automatic electrode adjustment result in optimum power use. All-electric operation excludes costs of handling and storing bulky fuels. Control of interior atmospheres assures peak quality.

Linings last longer. Replacement linings are installed quickly, with least out-of-production time.

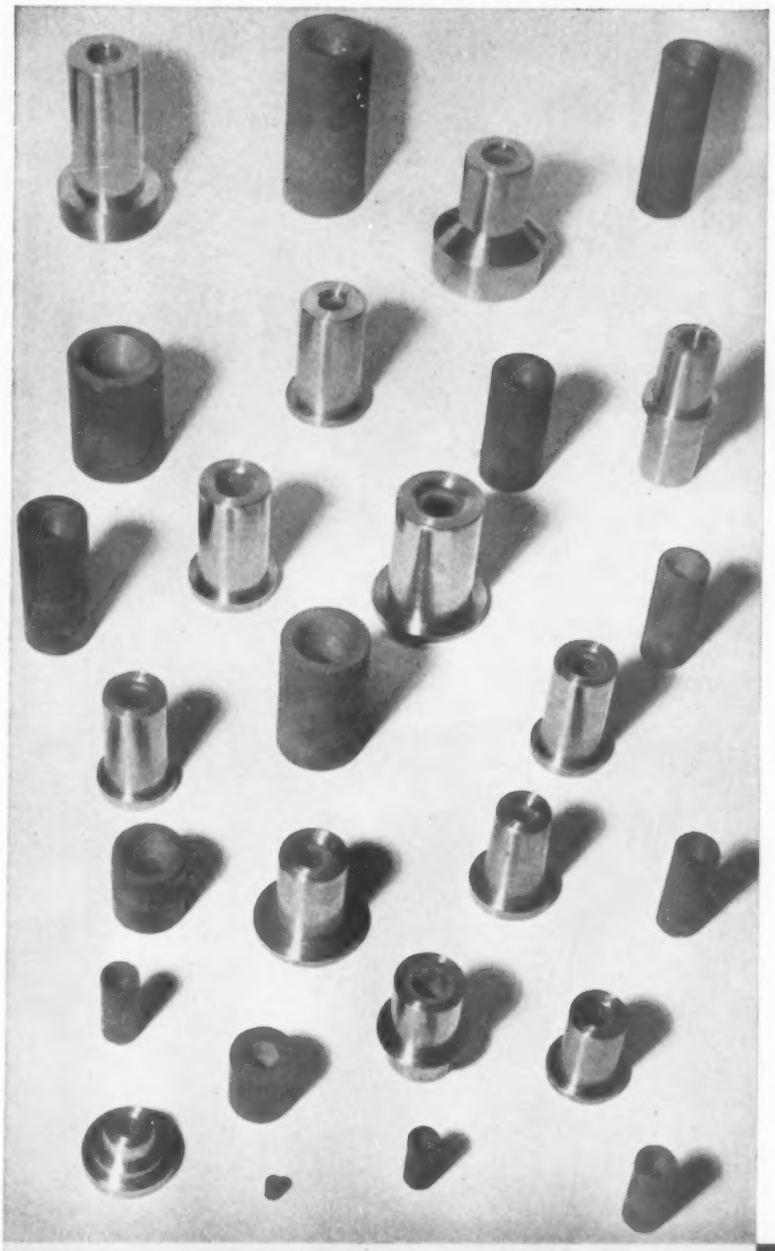
Increase YOUR Profits!

Whether you melt ferrous or non-ferrous metals, Detroit Rocking Electric Furnaces will give you top melting economies. Send us your production data. Our engineers will furnish facts on how you benefit through better quality control, greater production, with Detroit Rocking Electric Furnaces. Available with conical or cylindrical chambers, in capacities from 10 to 4000 lbs. Write, now, to:

DETROIT ELECTRIC FURNACE DIVISION

KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

Foreign Representatives: In BRAZIL—Equipamentos Industrias "Eisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N. Y.; MEXICO: Casco, S. de R. L. Atenas 32, Despacho 14, Mexico City, D. F.



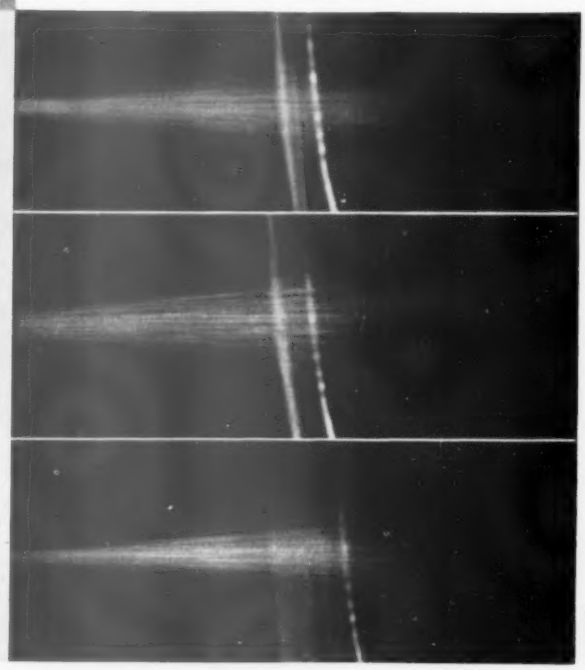
For Savings and Service
NORBIDE® *Blast Nozzles*

HERE ARE THREE GOOD REASONS why it pays to purchase NORBIDE pressure blast nozzles:

1. They give more service per dollar cost than any nozzle now available—guaranteed to give 750 hours with silica sand and 1,500 hours with steel grit before the orifice diameter enlarges one and one-half times. One NORBIDE nozzle will often outwear 1,000 iron ones.
2. The wear-resistance of NORBIDE nozzles decreases air consumption from 10% to 20% as compared with iron nozzles because the nozzle retains its original orifice for a long period of service.
3. NORBIDE nozzles increase production and improve blasting efficiency. Time is *not* lost for frequent changes of worn-out nozzles. And because the nozzle orifice is not readily worn larger, abrasive velocity remains more uniform with the maximum of cleaning efficiency and economy.

NORBIDE nozzles are made of Norton Boron Carbide—the hardest material made by man.

NORTON COMPANY
Worcester 6, Massachusetts



High-speed photograph of stream from new iron nozzle—note that stream concentration and abrasive velocity and volume are fair

Stream from the same nozzle after three hours with silica sand. Outlet opening worn to twice original size—stream concentration poor, abrasive velocity and volume low

Stream from Norbide Nozzle after 404 hours with sand—outlet diameter worn only 0.032"—hundreds of hours of useful life remain—marked stream concentration—high abrasive velocity and volume

SHAKEOUT IN SECONDS! KNOCKOUT IN MINUTES!

—THAT'S THE STORY AT STANDARD FOUNDRY CO. WITH FLOATEX®

Imagine! An 8000 lb. flask shaken out in seconds! The outside cores of that 3500 lb. casting knocked out in minutes!

That's the result at the Standard Foundry Co. plant in Worcester, Mass., with two Hewitt-Robins Floatex Shakeouts!

Standard Foundry needed two Floatex Shakeouts to keep up with high-speed production demands. But other foundries—hundreds of them throughout the world—are doing both flask shakeout and core knockout work on a *single* Floatex unit.

This versatile machine—with its genuinely full-floating principle that shakes the flask, not the foundry—can be equipped with a special cast-steel deck well able to withstand the punishing impact of core knockout work *in addition* to shaking-out flasks. One machine . . . one investment.

—and lowest imaginable maintenance cost! No Floatex cast-steel deck has ever worn out; no Floatex bearing or shaft has ever been broken —for none of the weight (of the machine or the superimposed load) is carried on bearing or shaft.

Hewitt-Robins Floatex Shakeouts are made in portable, stationary and mechanical self-discharging types—in sizes for castings weighing a few ounces to flasks weighing 100 tons or more. For all the interesting details, write for Bulletin 124-B, Robins Conveyors Division, 270 Passaic Avenue, Passaic, N. J.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

HEWITT-ROBINS

FLOATEX SHAKEOUT

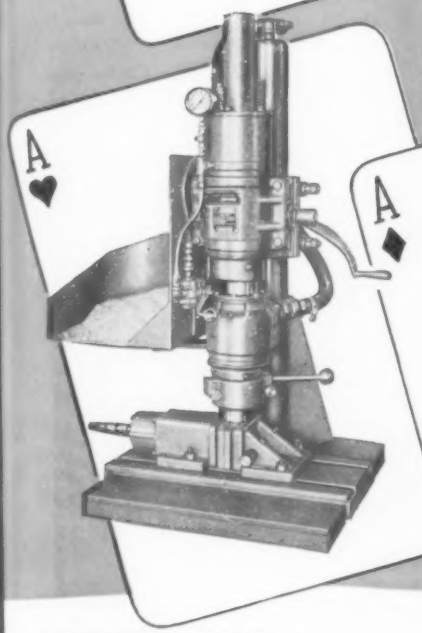
HEWITT-ROBINS HR INCORPORATED

BELT CONVEYORS (*belting and machinery*) • BELT AND BUCKET ELEVATORS • CAR SHAKEOUTS • DEWATERIZERS • FEEDERS • FOAM RUBBER PRODUCTS • FOUNDRY SHAKEOUTS • INDUSTRIAL HOSE • MINE CONVEYORS • MOLDED RUBBER GOODS • RUBBERLOKT ROTARY WIRE BRUSHES • SCREEN CLOTH • SKIP HOISTS • STACKERS • TRANSMISSION BELTING • VIBRATING CONVEYORS, FEEDERS AND SCREENS

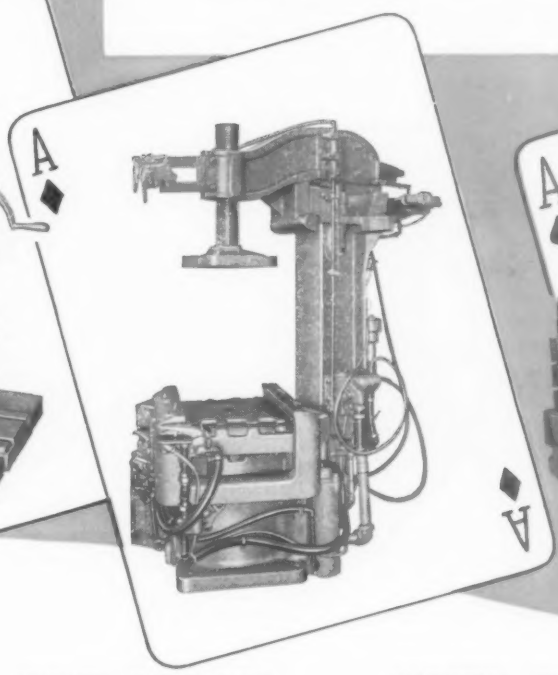
4 Aces For FOUNDRIES!

MILWAUKEE CORE GRINDER—Rotary Table Model with 30" grinding wheel, for continuous or intermittent grinding. Dual Table style with 42" grinding wheel, also available.

Here they are — Milwaukee Core Grinder, Core Blower, Molder and Briquetting Press—just the machines you need for your foundry. You'll find their performance outstanding . . . PROFITABLE! For Milwaukee machines rate ace-high in foundries all over the nation. Designed, built and serviced by Milwaukee engineers . . . all practical, seasoned foundrymen . . . these sturdy machines incorporate the latest engineering features . . . every one time-tested . . . features that give you the utmost in speed, safety and efficiency. Write today for literature.



MILWAUKEE - TACCONE CORE BLOWER—Bench style, explosion type, with 30% more blow pressure. Blows cores up to 4 lbs. in weight. All types of blow heads.



MILWAUKEE JOLT SQUEEZE RAIL STRIPPER—Arm type with 20" frame opening. Handles flasks up to 1000 sq. in. Also Jolt Squeezers, Pin Lifters, Strippers and Roll-off machines.

MILWAUKEE BRIQUETTING PRESS — Hydraulic type with capacity up to 4 tons of briquettes per hour. Converts low grade borings and turnings into ideal scrap.

ORE BLOWERS • CORE GRINDERS • MOLDING MACHINES • BRIQUETTING PRESSES

MILWAUKEE *Foundry Equipment*

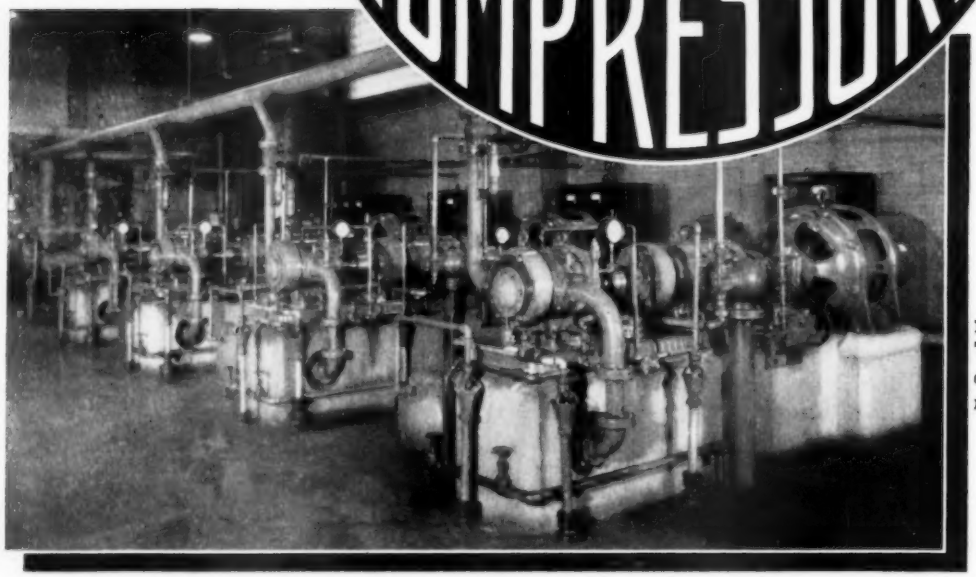
Division of SPO Inc.

3236 W. PIERCE STREET, MILWAUKEE 15, WISCONSIN, U.S.A.

CAPACITIES TO 3300 C. F. M. ACTUAL FREE-AIR DELIVERY

FULLER ROTARY COMPRESSORS

PRESSURES TO 100-125 LB. GAGE



Installation of four Fuller Rotary Two-stage Compressors.

Capacity each, 490 c.f.m., 125-lb. gage pressure.

From time to time, we meet with potential compressor customers, who, for some unknown reason, have formed the opinion that Fuller Rotary Compressors are only good for low-pressure service.

This, however, does not agree with the facts, as we are in a position to furnish, and have furnished, hundreds of machines for 100 to 125-lb. pressure, which are giving the same efficient and dependable service as units for lower pressure ranges.

The first compressors built by this company (and which are still going strong), were of the two-stage type for 100-lb. service. It was some time before we began the manufacture of single-stage machines for the lower pressures required in various industries.

Bulletin C-5, illustrates and describes Fuller Rotary Compressors and Vacuum Pumps. We'll be glad to send you a copy. We invite your inquiries and investigation the next time you are in the market for compressors or vacuum pumps.

FULLER COMPANY
CATASAUQUA—PENNSYLVANIA
Chicago 3 - 120 So. LaSalle St.
San Francisco 4 - 420 Chancery Bldg.

No. 1 of a series

C-191

A LIFETIME OF NEW MACHINE EFFICIENCY

FULLER

THESE TOUGH JOBS ARE MADE EASY

WITH THE **CLECO**

1480 HIGH SPEED PNEUMATIC

EDGE GRINDER

- Cutting gates and risers off stainless and chrome vanadium castings
- Cleaning up welds (especially stainless welds)
- Foundry finishing operations on monel, stainless steel, etc.

Many grinding and cutting jobs that were prohibitively expensive by older methods are made easy and economical with the Cleco 1480 Edge Grinder. Many users report that jobs which were formerly impossible on a production basis are easy with the Cleco 1480. Some report that the 1480 paid for itself in less than two weeks.

If you are grinding or cutting monel or hard alloy steel you owe it to yourself to find out what the Cleco 1480 will do. Give us the particulars of your problem. A Cleco Field Engineer can help you solve it—without obligation.

CLECO AIR TOOLS — CLECO ACCESSORIES

CLECO DIVISION

of the REED ROLLER BIT COMPANY, P. O. Box 2119, Houston 1, Texas, U.S.A.

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LET'S KICK IT AROUND

By TOM BARLOW

The foundry has a little gun
And with it they can shoot.
It patches up the cupola
And saves them dough to boot.
—Apologies to everybody

Well, here we are again. In case you have wondered what happened to this column—and I hope you have—I'll give you the low-down. I've been up to my ears in BONDACTOR Machines—*literally*. In the old days the boss said I could work on these little journeys into the literary world any time I wished—between 5:00 P. M. and 7:00 A. M.; or, as he so gracefully put it, "After you leave the bar and before you go to bed". Now, with the BONDACTOR Gun selling like free orangeade in Death Valley, there just "ain't no such hours". Why must people patch their cupolas at such horrible hours?

When we started to develop the BONDACT Process for patching cupolas about a year ago, we knew we had something good, but we didn't realize how good it was until a few months ago. Now it's like having a bull by the tail (that's just an expression—there's no particular significance to the word "bull"). We don't know how long we can run fast enough to keep up, but we sure aren't going to let go. Now that we are all accustomed to working 24 hours a day, we are going to bring a BONDACTOR Machine to the Convention in Cleveland so that we can work 32 hours a day. My friends won't know me. Already I'm plump instead of fat.

Since this stuff is "writ by hand" instead of by the advertising agency, we try to be simple and sincere. (That'll fix them for saying this column was a lousy idea.) (Yeah, it's easy for me to be simple.) The trouble is that even the truth about the BONDACTOR is so fantastic that it's hard to believe. We used to boast that many foundries paid for the equipment in three months. Then we found foundries saving enough to pay for the equipment in thirty days. Now we hear from a foundry that paid for the gun eighteen times over in one year! All these figures came from foundries melting from 25 to 80 tons per day. Now that the BONDACTOR is moving into the 2,000-ton foundries, I shudder to think of the savings to be made.

Originally we liked the BONDACT Process of cupola patching because we believed—and still do—that the improved quality of patch improved the quality of cupola operation. Lately I find myself talking like Alexander Botts. Figures like "save $10,000 to $40,000 per year per machine" just roll out by habit. I suppose you can't help feel that way when you see these gadgets reduce cost of materials, cost of chipping and preparation, and cost of patching. Sure, it's better, but who cares—it's cheaper!

My boss just reminded me (that's a polite way to put it) that I haven't even told you what a BONDACTOR is and does. Nuts! If you can read, you know what a BONDACTOR is. If you can't read, drop in at Booth 422 in Cleveland and I'll give you a personally conducted tour. (I'll be the tired-looking guy in the corner.) See you in Cleveland!

ONCE MORE: *We'll look for you at four-two-two.*

EASTERN CLAY PRODUCTS, INC., JACKSON, OHIO

DIXIE BOND • BLACK HILLS BENTONITE • REVIVO BOND • REVIVO SUPER BOND • BALANCED REVIVO

ECP PRODUCTS ARE SOLD WITH SERVICE THAT MEANS SOMETHING

Tapered Roller
TIMKEN BEARING
EQUIPPED

The little label with the big message

WHY do more than 1,000 manufacturers put this label on their products? Because it tells a story of *extra* value to every prospective buyer.

When a customer for your product sees the "Timken® Bearing Equipped" label, he knows he can count on dependable bearing performance. He knows that moving parts will last longer, work better, because they're held in proper alignment. He knows that friction is reduced to a minimum, maintenance and lubrication time cut. He's sure of extra years of service both in the bearings and in related assemblies.

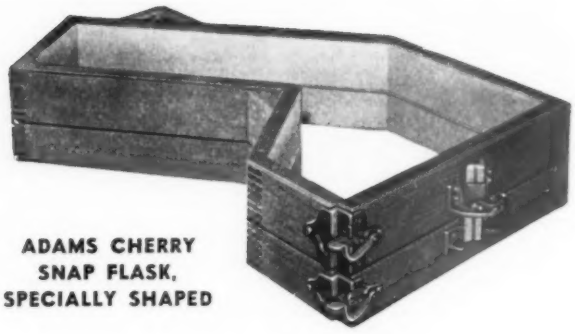
The "Timken Bearing Equipped" label has come to mean all these things for two main reasons: the outstanding *performance* of Timken tapered roller bearings for more than 50 years; the widespread *acceptance* of Timken products throughout all industry.

If you make a product in which wheels and shafts turn, give it an extra sales feature by using Timken tapered roller bearings. And make the most of that sales feature by using the "Timken Bearing Equipped" label in advertisements, booklets, folders, and on the equipment itself. For help in making use of the "Timken Bearing Equipped" label write The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

TIMKEN
TAPERED ROLLER BEARINGS

NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

ADAMS ALUMINUM
SLIP FLASK



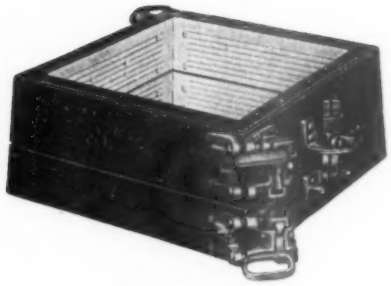
ADAMS CHERRY
SNAP FLASK,
SPECIALLY SHAPED

Any Shape—Any Size

FLASKS OR FLASK EQUIPMENT

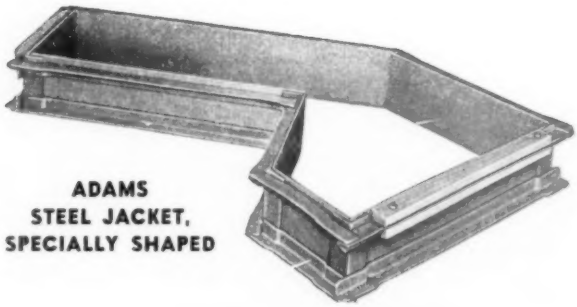
ADAMS-BUILT

To Your Exact Specifications

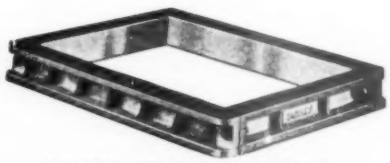


ADAMS CHERRY
EASY-OFF FLASK

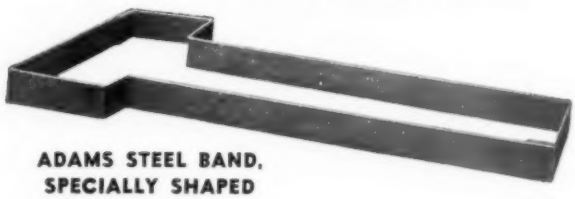
Whatever style, size or shape you need, Adams Custom made Flasks and Flask Equipment are built to your order, with any desired length, width or depth, by men who *know* foundry requirements. And when they are *Adams-Built,* they assure more efficient performance, longer life and faster production. They are designed to maintain peak production of high-quality castings, reduce rejects, lower production costs. It is hard to surpass Adams Flasks for accuracy, convenience and economy. Write for complete information today.



ADAMS
STEEL JACKET,
SPECIALLY SHAPED



ADAMS ALUMINUM UPSET



ADAMS STEEL BAND,
SPECIALLY SHAPED

THE ADAMS COMPANY
800 FOSTER ST. DUBUQUE, IOWA

The ADAMS Company

ESTABLISHED 1883

MOLDING MACHINES and FLASK EQUIPMENT

DUBUQUE, IOWA, U.S.A.

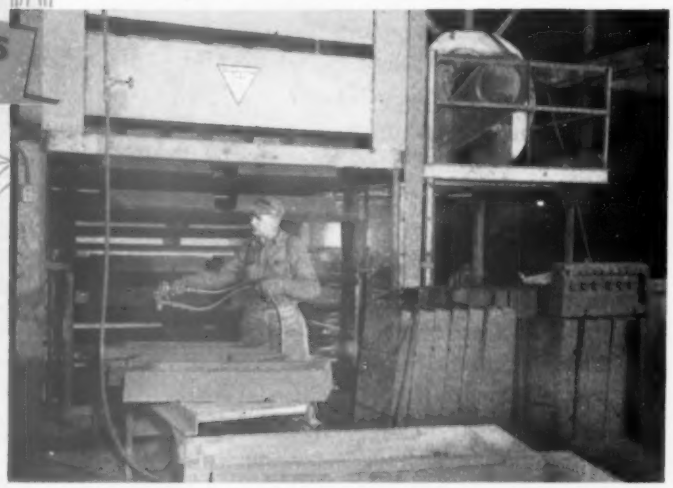
New DESPATCH Vertical Foundry Oven

Cuts Production Costs

Says MARATHON FOUNDRY

HERE'S WHY

High volume forced convection heating system with cross flow of heated air from heat duct through center of oven directs heat to every inch of the bake zone to permit accurate control of heat and air for proper preheating and baking of all cores. This assures more uniform baking, higher quality and fewer rejects. Up to 75% of heated air is recirculated which saves fuel. Balance is exhausted at top of oven carrying away objectionable fumes. Vertical oven construction saves floor space and arrangement of core racks on vertical conveyor subjects all cores to identical baking and cooling cycles. The oven is fired by a direct oil heater.



Cleaning cylinder head cores with an air blast after baking in a Despatch Vertical Oven at Marathon.

Loading cylinder head cores into a Despatch Vertical Core Oven at the Marathon Foundry.

Marathon Foundry and Machine Company of Wausau, Wisconsin, producers of Diesel cylinder heads and manifolds, report the following production achievements after installation of a DESPATCH VERTICAL CORE BAKING OVEN:

- **60% Increase in Production over previous method.**
- **30% Lower Maintenance Costs.**
- **Even Baking assuring higher quality cores.**
- **Notable Saving in Scrap because of better baking efficiency.**
- **Trouble-free Operation at all times.**

The Marathon Foundry uses about 35 tons of core sand daily and is now producing 525 cope and drag cylinder head body cores in a 16-hour day. They attribute this fine production record to the efficient, economical and labor-saving operation of their Despatch Oven installation.

DESPATCH FEATURES ASSURE FAST, UNIFORM CORE BAKING AT LOWER COST

INCREASED PRODUCTION! 100% convection heat and up to 75% recirculated air give you speedy warm-up, fast heat recovery after re-loading and fast baking.

QUALITY BAKING! Heavy-duty, hi-volume fans give speedy heat transfer, assure uniform baking. Equipped with automatic temperature controls and fire underwriters' approved safety system.

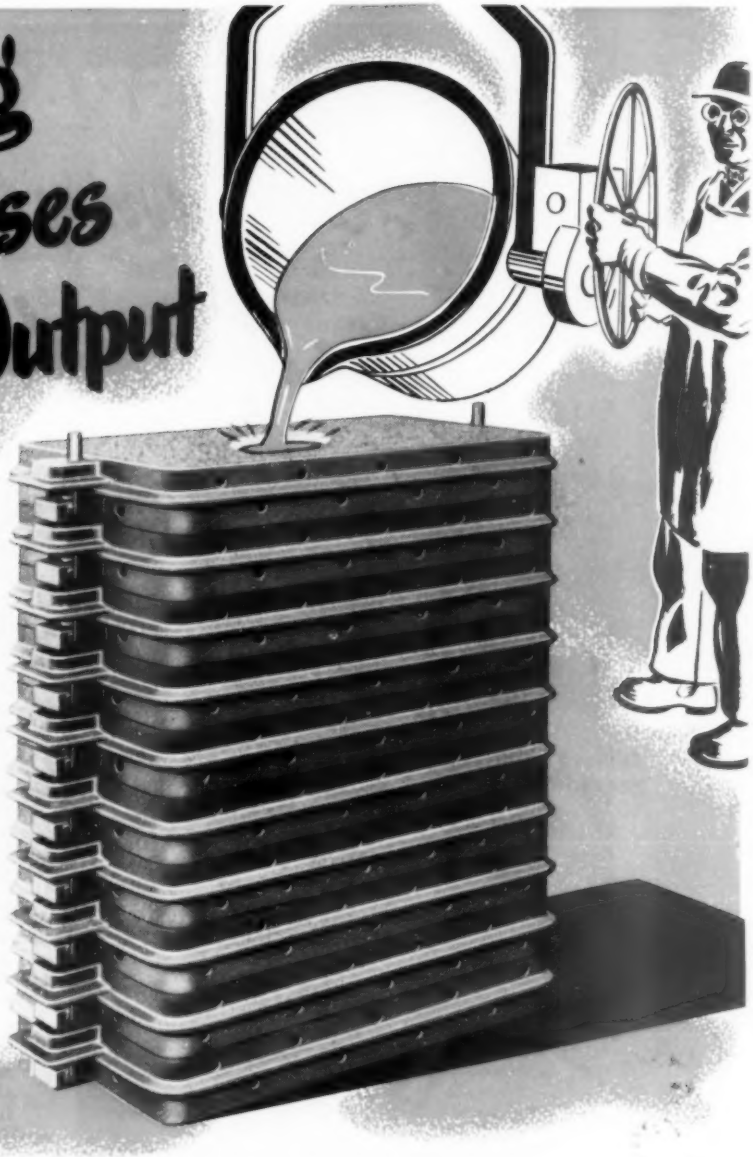
EFFICIENT OPERATION! DESPATCH direct gas or oil fired heaters cut fuel costs . . . ease of loading saves time and labor . . . compactness saves floor space.

WRITE TODAY for Bulletin 30 or request a representative to call.

DESPATCH OVEN COMPANY

MINNEAPOLIS OFFICE: 619 S. E. Eighth Street
CHICAGO OFFICE: 7070 N. Clark Street

Stack Molding Greatly Increases Your Casting Output



You want to modernize your foundry and step up casting production! Then be sure to investigate Sterling stack molding technique. It enables you to pour ten, or even twelve, sections at a time.

In stack molding, the molds are made in flask sections stacked one above another to a height of 10 or 12 sections. A common sprue through the stack feeds the molten metal to runners leading to individual casting cavities. The increased amount of hot metal in relation to the total flask volume generates tremendous heat with a corresponding increase in gas pressure. That's why –

Sterling Steel Flasks should be used for stack molding. They are ruggedly constructed of special rolled steel to withstand terrific pressures. A reinforcing rib around the side prevents distortion and misalignment of the stacked molds. Successfully job-tested in high production foundries over a period of years. Consult Sterling for your flask requirements. Write for new Catalog No. 60 just off the press.

STERLING WHEELBARROW CO.
MILWAUKEE 14, WISCONSIN, U. S. A.

A 5692-1P-C

Intelligent Selling Can Expand Casting Market

COMMENTS made over a period of time by purchasing agents and designing engineers indicate that many producers of castings are doing a relatively poor job of selling their products. If these criticisms are justified, the merchandising of castings is not being given sufficient attention to permit many foundries to hold the business of old customers or to enlarge the field served by the foundry industry by promoting castings as logical and economical replacements for components produced by other fabricating methods. Good selling in the face of present-day keen competition requires more than the sharpening of pencils.

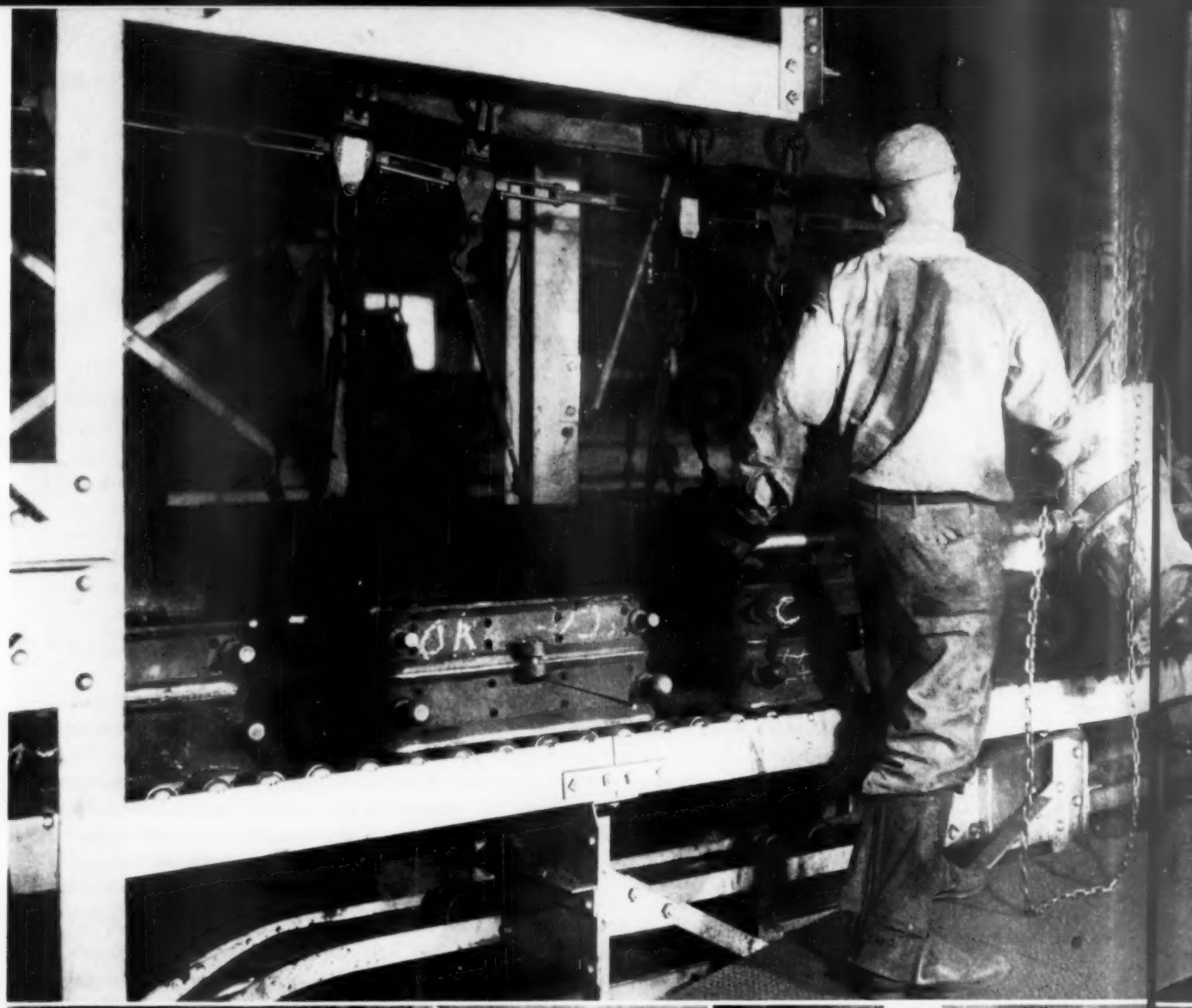
What are some of the factors which should be considered in building greater markets for castings? First, to do an intelligent job of selling, the foundry must produce a top-quality product, and must have controls to maintain that quality from day to day and from shipment to shipment. Much has been done in quality improvement and control during the past decade but, in many respects, the job has only been started. Successful selling demands the meeting of required specifications and the production of castings which will serve the purpose for which they were designed. To compete successfully with other products, the casting must do an equal or better job, and the price must be competitive.

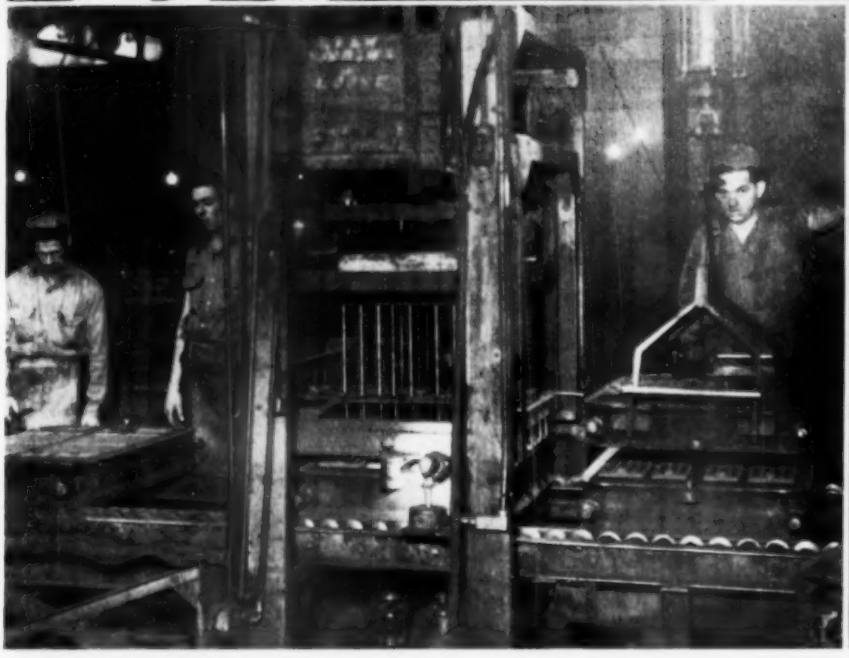
Because castings are components employed in building a wide variety of machines and products, a successful foundry sales program needs an engineering approach. The castings salesman should be completely familiar with foundry practices, and should understand the possibilities and limitations of these production methods. He should know the product and have faith in the ability of his organization to produce the type and quality of castings needed by the customer. At the same time, the salesman should have a good understanding of the customer's problems. He should be able to suggest more castable designs, indicate better methods of producing patterns, coreboxes, and other rigging, and in general aid the customer in satisfying his needs for high-quality castings.

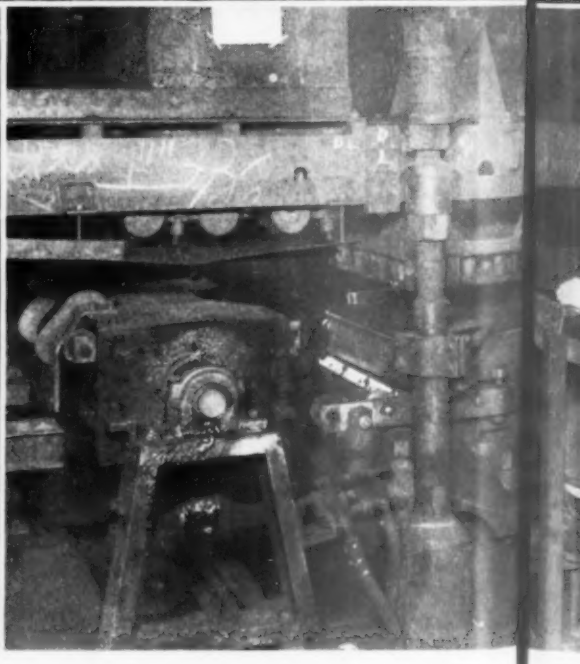
In addition to direct selling, other avenues of promotion are open to the foundry. These include publication advertising, direct mail, talks before engineering groups and participation in the co-operative promotional campaigns of the trade associations.

Even in today's competitive market, intelligent selling should permit the foundry industry to increase materially the demand for castings.

Frank G. Steinebach
Editor







Top—Pouring line at Burnham Corp. foundry, Zanesville, O. Men wear goggles, safety shoes, leggings *Below*—Automatic machine (left) deposits required number of chaplets into each drag as it passes under magazine. Operator at right sits at control board of unit which mechanically positions flasks

RADIATOR Section Molds

Made Four per Minute

By PAT DWYER
Engineering Editor
THE FOUNDRY

EVER since Adam bit into the apple and tipped the apple cart—and as a result was fired from his soft job in the Garden and was told with cold finality that he would have to earn his bread in the sweat of his brow—ever since this memorable and melancholy day, his brow-sweating descendants diligently have sought ways and means to reduce the volume of sweat exacted for each penny loaf.

Only in recent years has the curse been lifted to any appreciable extent. Men still living can remember when the modern giants Hy Draulic, Pneu Matic, S. Team and Alex. Tricity were captured, tamed and hooked to the world-wide industrial machine. Any person can remember instances in his own personal experience where one or more of these giants lifted the load and carried it higher and farther at a fraction of the former cost—and with a highly gratifying reduction in lame backs, aching feet, tired hands and general dehydration of sweat-drained bodies.

Less than 50 years ago, when pioneering molding machine manufacturers were trying to persuade foundrymen to adopt the mechanical devices, the daily stint of a bench molder in American foundries was 30 snap flask molds. Today, with the help of Pneu and a few friends, the output ranges in the hundreds. In many instances the work is a joint effort of a group of operators. The cycle of operation is broken down so that each man does a simple allotted part involving no great amount of physical effort, skill or training.

Over a period of many years makers of foundry equipment and foundrymen who like to peer into the future have visualized a foundry in which a man could manipulate the strings or buttons on a control board in a manner that would make the molds, set the cores, pour the metal and shake out the castings. In this ideal foundry the backaches and the sweat would be eliminated. The castings produced by mechanical equipment, with the shaky human element no longer an important factor, would be perfect in size, shape, in chemical and physical properties, and in quantity far exceeding any record set up under formal production systems.

The dream has been realized to a certain extent in the foundry operated by the Burnham Corp. at Zanesville, O., where that company manufactures cast iron sectional boilers and cast iron steam and hot water heating radiators. Two automatic and mechanized units near one end of the molding floor area have been in full operation for over a year. On the remainder of the floor area molds are still made in the orthodox manner and laid out in stacked formation. Eventually it is planned to install additional automatic units to handle the entire production with an estimated increase of 25 to 30 per cent. At

present each of the two cupolas, used alternately, melts 100 tons per day. With relatively heavy sprue and light castings, the daily casting yield is 65 tons.

Using cast steel flasks 24 x 32 in., 5 in. cope, 6 in. drag, the average production on each mechanical unit per eight-hour shift is 1300 molds. Top production is 1600 molds. As many as 3000 molds have been made on the two units in one day. Each mold contains three to five radiator sections with weight ranging from 50 to 70 lb including gates. On the boiler sections the average weight is 110 lb. Patterns are changed every other day.

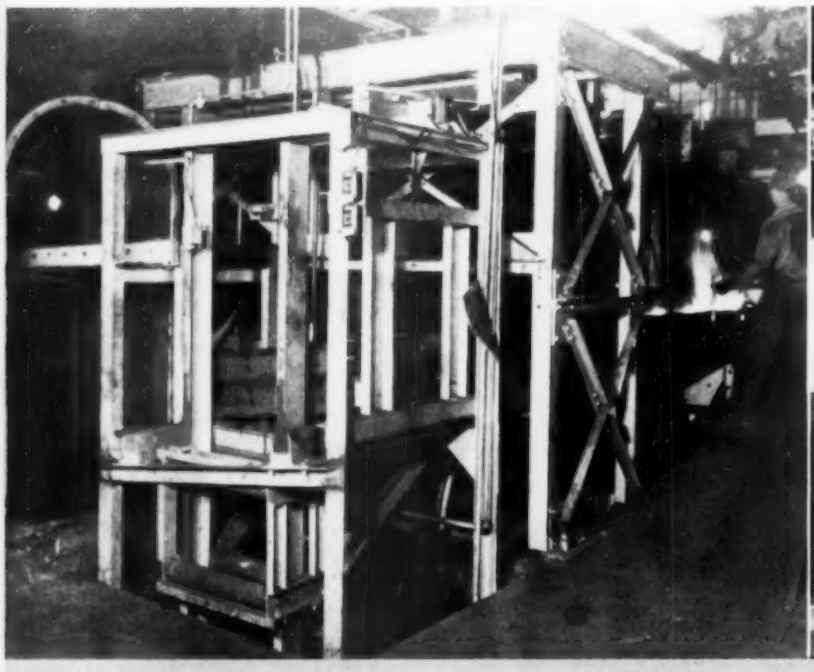
RADIATOR Section Molds

Speed of production does not compare with that of light, sound, jet planes or high-speed printing presses, but with everything clicking properly the molds on each mechanical unit flip through the cycle at rate of four per minute. To the onlooker the performance is somewhat reminiscent of a certain popular song with the refrain to the effect that if "You push the middle valve down, the music goes roun' and roun' and comes out heah!" In the molding unit, the operator sits in a chair and pushes the buttons on a control panel and the molds pass through the various stages of construction without the touch of a human hand. To an old-time shovel and rammer man the performance is positively uncanny!

The cope and drag flasks are fed into the cope and drag molding machines by an indexing device. This mechanically positions the flasks on the pattern plate. A feature in the speed of the machine is the fact that as a completed mold is rolled off the jolt-squeeze-roll-off machine, an empty flask is pushed on and indexed into position by the same device that pushes the mold off. A measured amount of sand is drawn from under a hopper located adjacent to the machine. An individual storage hopper is provided for each of the four machines. In the next move each flask is jolted and squeezed and the surplus sand is struck from the top of the drag. The sand falls through a grating onto a belt which carries it back to the sand processing station. Since the cope is not turned over, but lifted directly from the machine to a waiting drag, the surplus sand on top is not a factor. It remains undistributed with the exception of the area in the vicinity of the tapered sprue opening. An attendant with an air hose blows all loose sand away from this area.

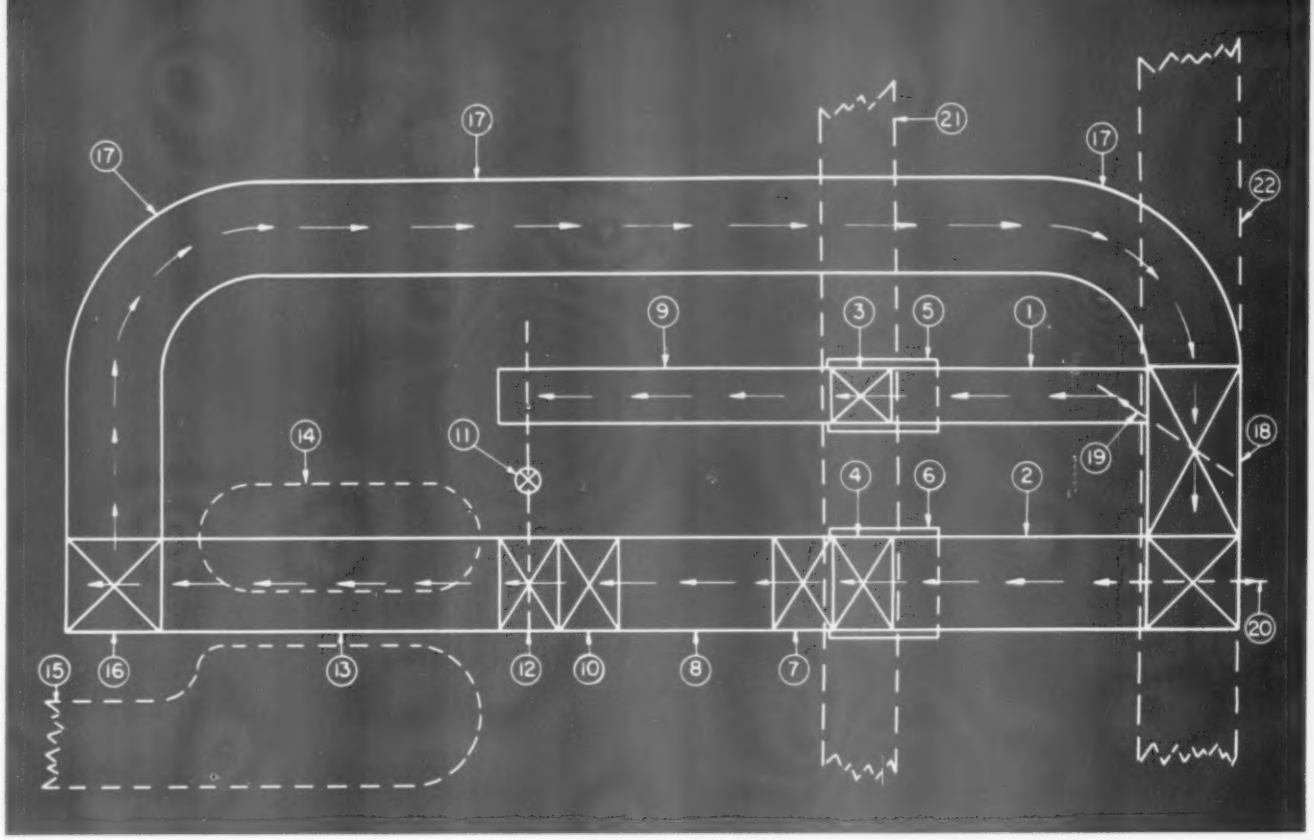
From the molding machine the drag moves forward, is rolled over automatically in a roll-over device, and moves forward to the core setting station. At this stage of the performance the push button control feature ends and the human element takes over for a brief period. Box-type drag chaplets are set in the mold manually, as they are few in number and require a minimum of time in the setting. The core setter then sets the cores and the mold moves forward on the conveyor.

At this point in the operation the mold is positioned under a chaplet setting machine which sets all the top chaplets. This machine is probably the most ingenious component of the entire assembly. The chaplets used are known as motor chaplets, consisting of a piece of thin wire about 3/16-in. long with a 9/32-in. round plate riveted on each end. This chaplet replaces a type used by the radiator indus-



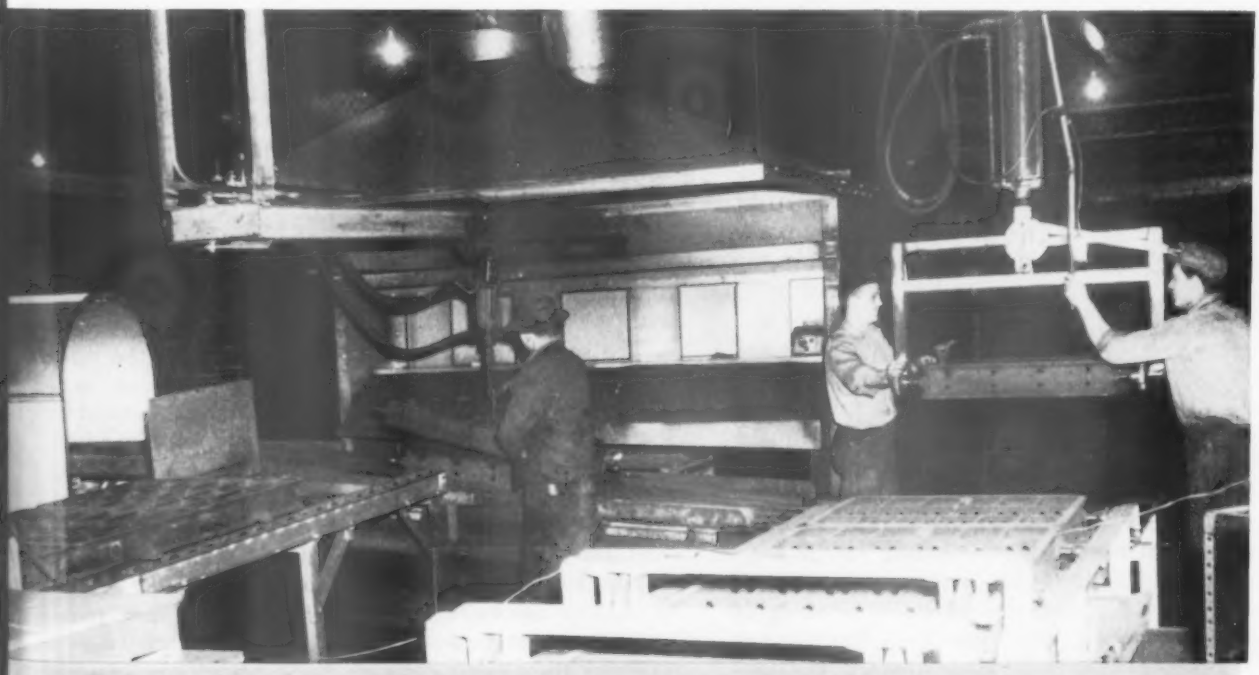
Elevator at end of the conveyor line transfers molds to a line that carries them through a cooling tunnel

After leaving the cooling tunnel, flasks are shaken out on a vibrating platform and returned to molding station



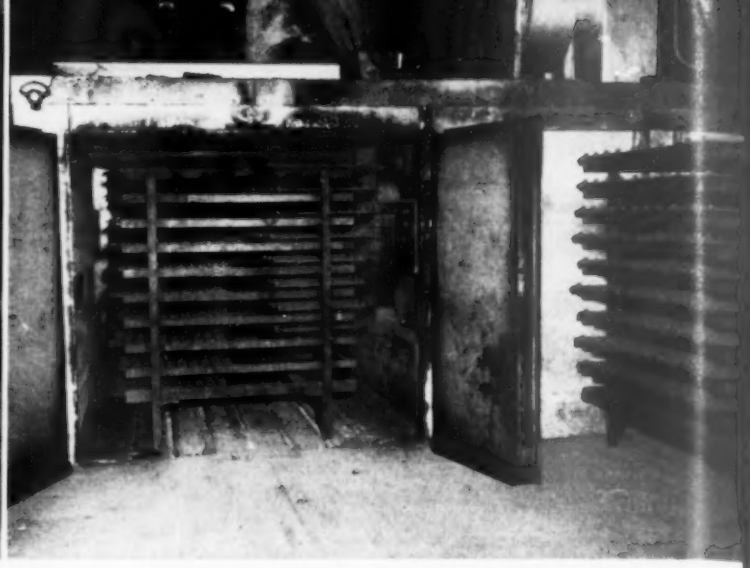
MECHANICAL MOLDING UNIT

1. Cope flask return conveyor
2. Drag flask return conveyor
3. Cope molding machine
4. Drag molding machine
5. Cope flask index
6. Drag flask index
7. Roll-over (drag mold)
8. Core setting line
9. Cope mold line
10. Chaplet setting machine
11. Cope transfer conveyor
12. Closing station
13. Pouring line
14. Weight conveyor (mold clamp)
15. Pouring monorail
16. Mold elevator
17. Mold cooling conveyor
18. Shakeout
19. Cope flask monorail
20. Drag flask monorail
21. Spillage sand conveyor
22. Shakeout sand conveyor



An effective exhaust system removes smoke, steam and dust as flasks are shaken out at this hooded station

At the shakeout a hoist lifts the empty cope onto one conveyor. The drag is rolled over and placed on another conveyor. Castings are removed by hand



Radiator section cores, shown here resting in dryer shells, are placed on ten-shelf racks for baking . A lift truck is used to load and unload the core ovens

try for many years and which consisted of a piece of wire about an inch long with either a square plate or a round coil head on one end. The other end was set in small holes in the pattern and the head became imbedded in the sand. When the pattern was removed, that part of the wire resting in the hole in the pattern projected above the face of the mold and supported the core the proper distance from the face of the mold.

After the top chaplets are set in place by the chaplet setting machine, the cope mold is picked up from the cope mold line by a small air hoist and swung over to the drag mold line and lowered into position on the drag mold. The complete mold then moves to the pouring line and is clamped mechanically by a series of 1000-lb weights suspended from an overhead conveyor and synchronized with the speed of the pouring conveyor. The molds are poured in motion as they pass down the pouring line, from ladles suspended on a monorail. Accuracy and nice timing are necessary to synchronize the melting, distributing and pouring speed with the movement of the line of molds.

RADIATOR Section Molds

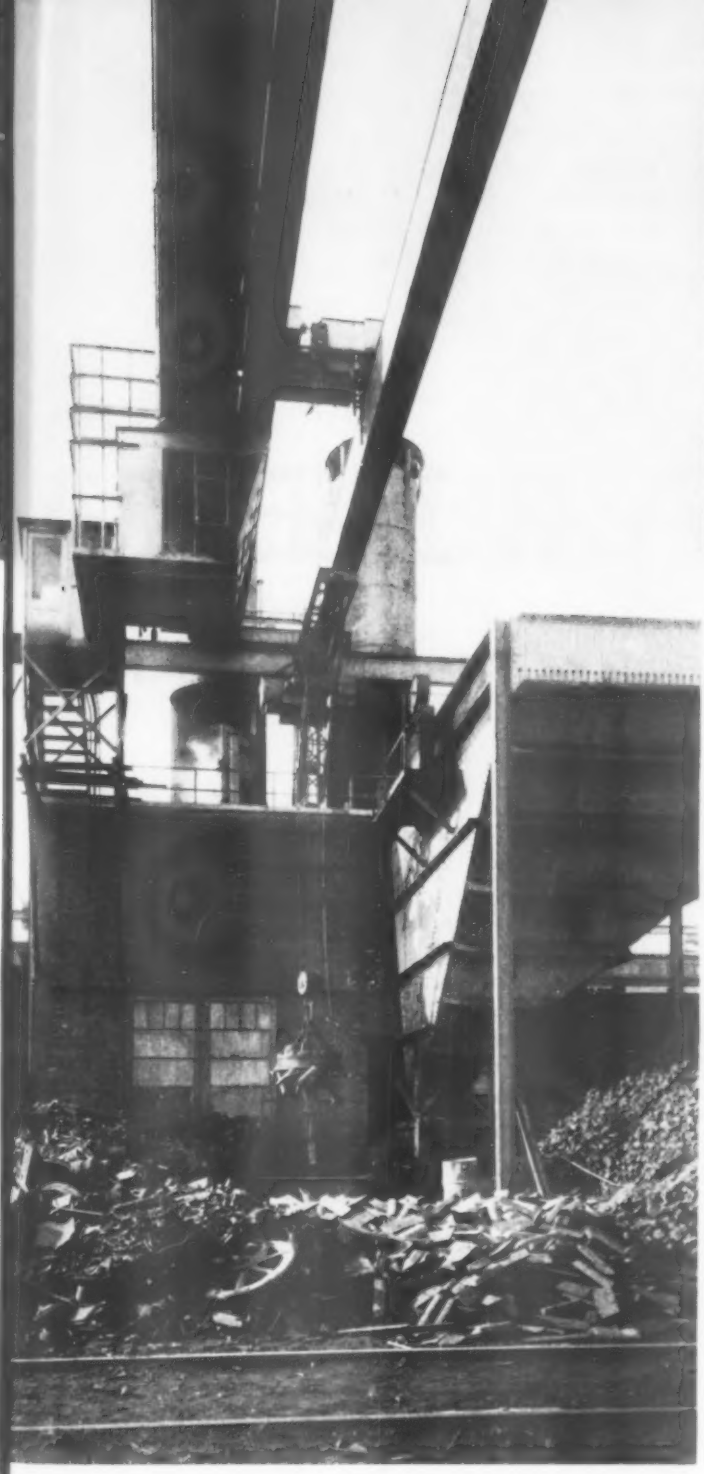
At the far curved end of the conveyor an automatic elevator lifts each mold in turn and shoves it onto the second parallel leg of the conveyor, moving first through a cooling tunnel and eventually to the shakeout. The entire mold is placed on a vibrating screen through which the sand falls on to a belt leading to the sand processing plant. Two attendants yank the still red-hot castings out of the empty flask. The drag is lifted and placed on one conveyor line. The cope is placed on another and both move toward the mechanical pushbutton controlled unit. And that is where we came in. The cycle is repeated continuously throughout the day.

A satisfactory sand mixture is a synthetic product made up from deposits of lake and bank sand from Michigan and New York. It is prepared in muller type mixers where a proprietary liquid binder, pitch and a small quantity of clay are added. It is distributed by belt conveyor to the hoppers of the automatic units. Samples are taken at 30-minute intervals throughout the day and tested in a well appointed sand laboratory. With occasional slight variation, sand in the system is held to the following standards as established by the American Foundrymen's Society: Permeability 50; green strength 14 lb; bond 6 per cent; moisture content 3 per cent.

Surplus sand from the various molding stations is carried by feeder belts and discharged onto the long main belt leading from the shakeout to the sand processing department situated high above the main floor. At the upper end the belt passes over a magnetic separator to remove metallic inclusions which fall down a chute into a container. The sand is carried upward and discharged into a large storage hopper from the bottom of which it is drawn in measured batches at regular intervals and discharged into the mixers. The entire sand supply, amounting to 250 tons, is processed several times every day.

The sand imparts a clean smooth skin to the castings so that the cleaning process is reduced to a minimum. On a vibrating screen the core sand is loosened and flows out through the small openings at each end of the radiator sections. The castings then travel upward on a conveyor and pass through revolving brushes which remove any remaining vestiges of sand from the outside. Sand from inside and outside the castings falls onto a belt which carries it outside the building where it is loaded in a truck and hauled away to the dump.

From the cleaning device the castings are trucked to the storage piles. Later they are taken in orderly rotation to the water testing machine where each section is subjected to water pressure test approxi-



Make-up of the cupola pig iron and scrap charges is accomplished by a magnet suspended from the crane. Charges may be diverted to either of two cupolas

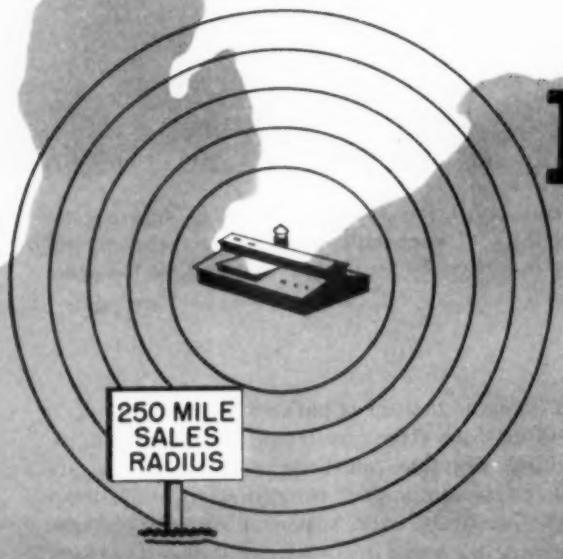
At the core bench the operator presses a plate against the joint face of each half core. A vent channel for the core is formed by small ridges placed on the plate

mately 140 lb psi. After testing the castings are faced off and reamed at the four nipple ports. Some types are also ground for a neat joint. The castings in any desired combination are placed on a special device where the malleable iron nipples are inserted in the openings at each end. A long steel arm descends and holds the sections in a rigid straight line while a motor-driven screw forces the sections into intimate contact. The units then are taken to the shipping room where they are given a final inspection, in some instances painted and then shipped from a loading dock either by truck or railroad car.

Coremaking practice, methods and materials are typical of those employed in radiation and other light work foundries over a period of many years. The cores must measure up to exacting specifications. They must be extremely accurate in size and shape, because the metal thickness of the casting is only ⅛-in. They must show maximum permeability and a continuous vent channel leading to a single small opening for the ready escape of gas generated when the mold is filled with liquid metal at high temperature. They must have sufficient strength to withstand handling in transit from the coreroom to the molding stations. The cores are not reinforced with rods or wires of any kind. The bonding agent is nicely calculated to burn out completely. These two factors materially reduce time and labor in the cleaning room where the disintegrated sand runs out of the small openings as freely as the sand in an hourglass runs from the upper to the lower chamber. Finally, rigging and equipment must be provided to turn out a sufficient number of cores per day to meet the almost insatiable demand from the molding stations. The ease, grace and skill, the manual dexterity which enable a bench operator to load the core racks on a high-speed production schedule constitute an important factor in the cycle of operation.

Cores are made from clean, new silica sand, grain fineness 60, bonded with oil in the proportion of 1 part oil to 40 parts sand. The mixture is prepared in a paddle type mixer and wheeled to the core benches in the near vicinity. The metal corebox for making the radiator cores is in two parts, split along the joint line and corresponding to the two half patterns on the molding machines. With the half boxes lying side by side on the core bench, the operator employs both hands to fill them overflowing with sand. The sand is not rammed in the ordinary manner, or even patted down with the hands. (*Please turn to page* 201)

By C. P. HAWKINS
Vice President
Trundle Engineering Co.
Consulting Management Engineers
Cleveland



MARKET A

A Simple, S

ESSENTIAL to the everyday existence of any commercial enterprise with its "ear to the ground and eye to the future," effective merchandising poses a problem for many foundry managements. By no means is this a startling overnight development. Rather, it directly reflects a condition long characteristic of the whole industry. But today, its urgency of solution commands greater importance and demands increased attention from small and medium-size foundries particularly.

Although the industry's overall output of ferrous and nonferrous castings last year dropped only 15 per cent under the all-time production peak established in 1948, the slump in orders has not affected all foundries correspondingly. Some plants, notably marginal producers, have shut down operations completely; others have cut back production sharply.

This is not to say the bottom of the barrel is falling out for the average foundry. Far from it. The industry generally is still very much "alive and kicking," as the production level in recent months so amply attests. Yet, while operations have climbed from last summer's low ebb to a substantially higher plateau, lower volume output is prompting numerous foundrymen to examine and appraise the sales side of their business with deepening concern as they contemplate future prospects.

What's behind the presently slackened demand for castings as compared with 1948? Basically, it's the old demand-and-supply story. With the manufacturing industries' immediate postwar requirements having been adequately met, order backlogs of many foundries have melted. Capital equipment and consumer durable pipelines are filled, signalizing the reemergence of a competitive market pattern. Because castings are standard components of myriad integrated machinery, any change in the demand for and supply of these end-products inevitably affects foundry operations, as customer casting requirements

Marketing area limitations and stiffer competition from other industries place increased importance on merchandising for many foundries. What to do about it and how? Market analysis, the author holds, is the first step. Such a study recently helped one medium-size foundry simplify its sales job by pinpointing customer demand and providing a basis for sound selling.

ANALYSIS—

Successful Tool for Increasing Sales

are normally the only basic sales determinant.

Currently reduced operations hold particular significance to many foundrymen because it brings into sharp focus—sharper now than at any time since the war—the industry's general lack of effective merchandising and vital need for better salesmanship. There lies the big problem—and paradoxically enough, the "golden opportunity" — for small and medium-size foundries today.

Traditionally, foundrymen have been extremely production conscious. Indeed, a merchandising- minded operator has proved the rare exception. As proof of the pudding, consider the Herculean strides made on the production line in recent years. Installation of continuous pouring units, development of automatic processing controls, simplification and mechanization of materials-handling operations—these advances and others testify to the industry's progressive search for new and improved short-cuts to reduce labor and materials costs, boost productivity, and improve product quality.

But merchandising—that's something else again. This phase of foundry operation has failed to receive the same concerted emphasis in management thinking. Salesmanship has suffered in management of production, despite the fact many foundrymen long have recognized their need for and lack of aggressive merchandising.

Merchandising Deficiencies—As one illustration of this industry-wide situation, let's take a quick look at gray iron foundries. In 1947, Raymond L. Collier, executive vice president of Gray Iron Founders' Society Inc., made a special survey-report covering the production and marketing operations of some 626 foundries (more than 20 per cent of the nation's total). The findings, particularly those relating to merchandising and selling, are significant. For example, this study shows that:

1. Less than 100 of 626 foundries engaged in sales promotion activities, spending about $292,662, even though the industry in 1947 shipped about 12½ million tons of castings exceeding $1 billion in value.

2. Most gray iron foundries do no sales promotion whatever.

3. Less than one foundry in four employs full-time sales representatives to solicit new business.

4. One foundry in seven conducts research to improve their product metallurgically; one foundry out of 15 carries on research to improve production methods; one foundry out of 25 does research solely to broaden markets or improve present sales methods.

5. Of nearly $725,000 spent annually by about 100 foundries for research (approximately $7000 per foundry), less than 10 per cent goes into product merchandising promotion.

6. Foundries in general lack dependable information on markets for gray iron castings.

Market Study—These findings and current condition unquestionably make the merchandising job one that deserves unstinting attention. How to expand sales volume profitably, without price cutting and its demoralizing marketing effect? The answer? The first and foremost step is market analysis—a simple, sound approach that foundrymen generally have overlooked, due chiefly to their preoccupation with production problems.

Without proper market preparation, the result invariably is: (1) High selling costs, (2) a volume of sales less than anticipated, or (3) development of a product that fails to meet customer needs. No manufacturing activity starts without a design for the product that properly relates its component parts so as to accomplish the results required in its use. Such product preparation is carefully engineered through fundamental and applied research, as well as detailed preplanning for the objective required.

Similarly, exacting consideration must be taken in preparing for merchandi- (*Please turn to page* 140)

Both the foundryman and his customers will benefit from intelligent use of specifications for gray iron castings, the author indicates. This paper was presented in San Francisco at the first Pacific Area National Meeting of the American Society for Testing Materials, Oct. 10 to 14, 1949

Development, Significance and Uses of Specifications for Cast Iron

By H. BORNSTEIN
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Materials Engineering Department
Deere & Co., Moline, Ill.

PROGRESS in certain fields may sometimes be measured by changes in specifications. In the case of cast iron it may be of interest to trace the changes which have occurred in specifications for that material over a period of some 30 years that the writer has been a member of Committee A-3 on Cast Iron of the American Society for Testing Materials.

The *ASTM Book of Standards* for 1916 includes specification A48-05 (which had been adopted in 1905). This specification provided for light, medium, and heavy castings and made provision for transverse test on an "arbitration bar." This bar was 1¼ in. diam. by 15 in. long and was broken on supports 12 in. apart. The test bar, was supposed to measure the quality of the iron "in the ladle," which had no relation to the section size of the castings.

The minimum breaking loads provided were: Light castings, 2500 lb; medium castings, 2900 lb; heavy castings 3300 lb. The castings were defined as follows:

"Castings having any section less than ½ in. thick shall be known as light castings. Castings in which no section is less than 2 in. thick shall be known as heavy casting. Medium castings are those not included in the above classification."

Tension tests were *not* recommended but these minimum tensile properties were provided, when specified: Light castings, 18,000 psi; medium castings, 21,000 psi; heavy castings, 24,000 psi. The tension test piece was machined from a broken half of the transverse test bar. The tensile bar was machined to a diameter of 0.800-in.

In 1918 this specification was revised and became A48-18. The figures for minimum transverse and tensile strengths remained the same. It is interesting to find that the specification had this footnote: "It is recommended by Committee A-3 on Cast Iron that the tension test shall not be made, for the reason that cast iron is almost devoid of elasticity, and hence any deviation from an absolutely straight pull in commercial testing machines yields defective results."

In 1924 it was recognized that there was need for cast iron which had strength requirements higher than those provided in Specification A48-18. So, a new specification was adopted to provide for "High-Test Gray Iron Castings." This specification was designated A88-24 and provided for a minimum tensile strength of 28,000 psi. The minimum transverse load was 3800 lb using the 1¼-in. bar on 12-in. supports. The specification further provided that the tension test would be made only when specified by the purchaser and at his expense.

Changed Arbitration Test Bar

In 1929 changes were made in specifications for both gray iron castings and high-test gray iron castings. In each case the principal change was the adoption of a 1.2-in.-diam bar to replace the 1.25-in.-diam bar. Also, the 1.2-in.-diam bar was 21 in. long and broken on 18-in. supports, while the 1.25-in. bar had been broken on 12-in. supports. The "Arbitration Test Bar" and the tension test specimen were provided for in a separate Specification A124-29. These changes were first recommended by Committee A-3 in 1927. Following is excerpt from the 1927 report:

"For several years the committee has had under consideration a change in the arbitration test bar. It was felt that the standard bar was deficient in respect to values for deflection. Also, the standard bar did not conform with test bars used abroad. After considerable work and discussion, the committee has adopted a new tentative arbitration test bar. This bar comes closer to being an international standard and also appears to give better values for deflection of cast iron."

The change in dimensions, etc. of the transverse (arbitration) test bar made it necessary to change the minimum values for loads and deflections of light, medium and heavy casting as follows:

(*Please turn to page* 222)

By JOHN HOWE HALL
Consultant
Swarthmore, Pa.

STEEL FOUNDRY

Core and Molding Sands

Required properties of molding sand for the production of steel castings are discussed by the author in this first of a series of five articles. Various tests for determining permeability, green and dry strength and other properties of sand mixtures also are described

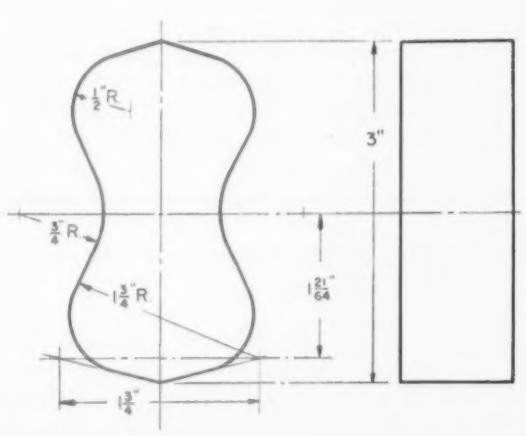
MOLDS in which steel castings are to be poured must be made of materials that will not chill the metal to rapidly and thus prevent it from flowing freely into all parts of the mold cavity. They must retain their form while being filled and until the steel has sufficient strength to maintain its shape without exterior support. Finally, the mold must separate from the solidified casting with the least possible adherence. Though not absolutely essential, it is often desirable that when the casting has cooled, certain portions of the mold should be reduced to a loose mass of noncoherent material. Unfortunately, in actual practice, not all of these requirements can be completely fulfilled, and the molds usually fail to function perfectly in one or more respects.

Metal molds can be used only for steel castings of simple shape, with no protruding or back-drafted portions to prevent their withdrawal from the mold. Actually, ingots to be rolled, hammered or pressed are steel castings, and in almost all cases are poured in cast iron molds of such shape that they can be completely filled either from the top or from the bottom without misruns, and can later be slipped off the solidified steel. By making the mold walls so heavy that the surface of the steel solidifies rapidly, adherence between ingot and mold is prevented. As described in the August, September and October, 1948, issues, hollow pieces of cylindrical shape are produced by the centrifugal method in metal molds, from which they are readily withdrawn after solidification. Very long pieces with thin walls, however, can not be so made, because metal molds absorb so much heat that the liquid steel will flow over them only to a limited distance.

Steel castings, therefore, generally are made in molds formed of loose refractory materials held together by bonding materials of various kinds rammed against patterns or into coreboxes. Sometimes small portions of the mold surface are made of iron or steel chills, whose function is to hasten solidification of the steel. Since the mold material must not soften greatly at the temperature of liquid steel, it is essential that it be highly refractory, and because much of it is wasted in breaking up the molds and cleaning the castings, it must be cheap.

With few exceptions basic refractories—such as lime and magnesia so widely used for the linings of melting furnaces—have been found unsuitable for steel foundry molds. Other refractory minerals such as corundum, chromite, zirconite and ilmenite, though possibly suitable for the purpose in some ways, are too expensive to be used widely. The only natural materials abundant enough to be cheap, and sufficiently refractory to resist the temperature of liquid steel, are silica sand and some clays. The former is composed of finely divided particles of quartz, the oxide of silicon (SiO_2), while clays are hydrous silicates of aluminum, with the approximate formula $2\,H_2O \cdot Al_2O_3 \cdot 2\,SiO_2$.

Unfortunately, not all deposits of silica sand are sufficiently free from contamination by other minerals to be suitable for steel foundry use. In many areas, the rocks from which the sands were derived contained magnetite, chromite, spinel and other hard minerals which resisted the tendency of the streams and waves to break them (*Please turn to page* 188)



Dimensions of briquet for testing tensile strength of core sand mixture used in steel foundry practice

By ALBERT E. GROVER
Cost Consultant
Cleveland

INVENTORY CONTROL

The author discusses the advantages of maintaining a perpetual inventory of foundry materials and supplies. Details are given of an effective method of inventory control, together with the forms required for its use

A GOOD system of inventory control will keep the investment in raw materials at the lowest possible point consistent with best results.

Quoting from a bulletin, "Perpetual Inventory and Stores Control," issued by the Department of Manufacture, Chamber of Commerce of the United States: "In an article in *Nation's Business,* Samuel Vauclain, president of the Baldwin Locomotive Works, made the following significant statement to illustrate the money value of machinery and equipment used in a factory:

" 'I illustrated by throwing some money on the ground which the men all ran after to pick up. This explained very forcibly the fact that everybody would scramble to pick up money, but that nobody there seemed to have the slightest desire to pick up the machinery lying around, all over the shop floor, each piece of which was more valuable than any of the money which I had scattered. They all saw the point at once, and thought it was a very good way to demonstrate the reckless manner in which they were handling things.'

"What is thus so well stated by Mr. Vauclain with respect to machinery may be applied with equal truth and propriety to the handling of raw materials, semi-finished material and supplies. When capital is in the form of cash it is carefully protected, its receipt and disbursement safeguarded, its custodians held to a strict accounting, but once this capital is converted into materials there is a tendency to become lax, to lose sight of the value of the investment, to husband the capital less diligently, to tolerate practices that are wasteful, inefficient and needlessly expensive."

The Chamber of Commerce's remarks apply to foundries as well as individual companies in other industries.

Many foundries do not think it practical, from a clerical standpoint, to maintain a control over the receipts and usage of metals and supplies. However, these same companies keep careful records of cash, accounts with suppliers, and transactions with customers. If more clerical help is required to keep these records, it is provided without hesitation. There is as much, and sometimes more, liability for lost dollars caused by misuse of materials and labor than cash or accounts. In fact, dollars in the bank are traded for materials and labor used to convert metals into shapes and sizes suitable for the customers' use.

Many perpetual inventories are carried in quantities only, which does assist management in providing materials and supplies for production at the right time, but does not measure the dollars represented. Without the accurate measurement of these dollars a reliable profit-and-loss statement cannot be had.

Pricing inventories of different characters is very important. I prefer pricing at actual cost. This cost includes: Materials and Supplies — invoice cost, freight, express and drayage, handling; Work in Process—metals, direct labor, normal overhead.

If the foundry operates on standard costs, I would use the adopted standards, being careful to report the variances between actual and normal standard as an operating profit or loss.

Admittedly it takes clerical effort to maintain a perpetual inventory. However, it requires some effort to measure and price a physical inventory. For example, many years ago I was the cost clerk for a foundry and machine shop employing about 150 men. We maintained a perpetual inventory system which recorded both quantities and values. One young lady

METAL COST CARD

Kind – NO. 2 PIG — Car No NYC 164861

Received From – THE PIG IRON COMPANY — Date JAN 5, 1950

		POUND	COST	DATE	
COST – Invoice	$ 1770 00				
Freight	$ 80.00				
Unloading	$ 10 00	93,000	$1,860.00		
		8,000	160 00	1-9-50	USED
UNIT COST .0200 PER POUND		85,000	1,700.00		INVT
PIG IRON ANALYSIS					USED
	%				INVT
	%				USED
	%				INVT
	%				USED
	%				INVT
	%				USED
	%				INVT
	100 %				

FIG. 3

PURCHASE INVOICE
PIG IRON, SCRAP ALLOY

METAL COST CARD

Kind NO. 1 PIG Car No NYC 164786
Received From INVENTORY Date JAN. 1 1950

		POUNDS	COST		
COST- Invoice	$ 720.00				
Freight	$ 40.00				
Unloading	$ 10.00	36,000	770.00	DATE	
UNIT COST .0214 PER POUND		11,510	245.91	1-2-50	USED
		24,490	524.09		INVT
					USED
					INVT

PIG IRON ANALYSIS

	%
	%
	%
	%
	%
	%
	%
	100 %

FIG. 1

This record $770.00
all other records 44394.00
total inventory $45,164.00

LEDGER

ACCOUNT- No. 1 Name PURCHASED METALS

DATE	EXPLANATION	DEBITS	CREDITS	BALANCE
				$ 45,164 00
1-1-50	Inventory at start of System	$ 20,942 58		
1-31-50	Purchases for the month		$ 39,006 00	$ 27,100 58
1-31-50	Used in January			

FIG. 2

DIAGRAM NO.1
INVENTORY AT START OF SYSTEM

PURCHASE INVOICE

FREIGHT BILL

UNLOADING RECORD

METAL PURCHASES 1950

NORMAL MONTH	$	$	$	$

METAL PURCHASES 1950

MONTH OF January

DAY	SOURCE			CHARGE
	INVOICE	FREIGHT	UNLOAD	
1	$ 1,610 18	$ 110 10	$ 25 60	$ 1,745 88
2				
3				
4				
5				
28				
29				
30				
31				
JAN	$	$	$	$
(MONTH)	$	$	$	$
(MONTH)	$	$	$	$
(MONTH)	$	$	$	$
TOTAL YEAR	$	$	$	$

FIG. 4

LEDGER

ACCOUNT- NO 2 NAME Purchased Metals

DATE	EXPLANATION	DEBITS	CREDITS	BALANCE
				$45,164.00
1-1-50	Inventory at start of system	$20,942.58		
1-31-50	Purchases for the month		$39,006.00	27,100.58
1-31-50	Used in January			
2-28-50	Purchases for the month			
2-28-50	Used in February			

DIAGRAM NO.2
METAL PURCHASES (PIG IRON, SCRAP ALLOY)

and I, working ten hours a day, did all the payroll and cost work and "believe it or not" we always had our data for inclusion in the monthly operating statements ready by the fourth of the following month.

That was before modern accounting machines were even made. All the equipment we had was a Wales adding machine.

An average of 50 patterns was in the sand each day. By using a normal overhead figure we were able to furnish management by noon the following day after producing, a statement of costs of the several patterns.

To maintain a continuing check on the accuracy of the perpetual inventory, we measured the quantities actually on hand each time the stock was at "low tide," and compared our findings with the quantities shown on the inventory record. Thus we were able to make adjustments currently which enhanced the accuracy of the inventory figures used in the monthly operating statement. By measuring items of stock when there is a minimum on hand reduces the possibility of error in count or weight. Ten pieces can be counted easier and more accurately than 1000 pieces, and 1000 lb can be weighed easier and more accurately than 50,000 lb.

After seven years of operating that perpetual inventory system (no annual physical inventory having been taken during that period), the principal stockholder died and his stock acquired by a man who wanted control of the business. When presented with the balance sheet of the company he refused to accept the statement of inventory value when based on a book figure. Under his supervision a physical inventory was taken, the records being used only to secure unit costs for pricing his physical count.

After the physical inventory had been calculated the items that showed the largest variance beween the book figure and the physical inventory were checked; of the 55 items so checked the book figure was found correct on 53 of them. In measuring the items of stock, there were errors in counts or weights, some items were missed; some items were not listed by the right names which led to using the wrong unit prices.

The cost of taking that physical inventory was estimated to be $1200. Compared with the $1560 annual cost of operating the cost department, of which only a portion was chargeable to perpetual inventory records, was convincing evidence of the practicability of continuing inventory control during the fiscal year.

It must be understood that this event happened in 1912 when costs were much lower than those today. As a top cost clerk, my salary was $80 a month, whereas a cost clerk of equal ability today would be paid $240 a month and the shop employee who then earned 15 cents an hour would draw $1.50 today. Therefore it is evident that if like conditions prevailed today the cost of the physical inventory would be many times greater than in 1912. Also, the cost of maintaining a cost department would be materially increased. The cost of clerical effort in 1950 is approximately three times what it was in 1912, and the cost of employees who would take the inventory is approximately ten times what it was in 1912. Considering these wide differences in increased cost of taking physical inventory as compared with a lesser increased cost to maintain a perpetual book inventory, it appears that the practicability of the book inventory is of as much or more importance than in 1912.

The accompanying diagrams illustrate a good method of inventory:

A metal cost card, Fig. 1, is prepared for each separate car actually on hand. Each car of metal,

METALS USED

MIXTURE NO. _____ CHARGING DATE _____

PIG IRON ANALYSIS	GRADE	TALLY 5	10	15	20	25	30	35
	%	////	///					
	%							
	%	REMARKS						
	%							
	%							
	%							
	100 %							

	CAR NO.	ALLOY	SCRAP PUR	SCRAP HOME	COKE	FLUX
WEIGHT ONE CHG.						
TOTAL WEIGHT						

FIG.5

METAL COST CARD

KIND No.1 Pig CAR NO NYC 164786

RECEIVED FROM Inventory DATE Jan 1, 1950

		POUNDS	COST	DATE	
COST-INVOICE	$ 720.00				
FREIGHT	$ 40.00				
UNLOADING	$ 10.00	36,000	$ 770.00		
UNIT COST .0214 PER POUND		11,510	245.91	1-2-50	USED
		24,490	524.09		INVT
PIG IRON ANALYSIS					USED
	%				INVT
	%				USED
	%				INVT
	%				USED
	%				
	%				
	%				
	100 %				

FIG.6

LEDGER

ACCOUNT- No. 2 Name HOME SCRAP

DATE	EXPLANATION	DEBITS	CREDITS	BALANCE
1-1-50	Inventory at start of system			$ 500 00
1-31-50	Produced in January	$ 10,588 77		
1-31-50	Used in January		$ 10,368 00	720 77

FIG.7

DIAGRAM NO. 3
METAL USAGE

DIAGRAM NO.4

SUPPLIES

REQUISITION FROM STORES

PURCHASE INVOICE

MATERIAL RECORD

MATERIAL KIND _____ PART NO. _____

DATE 1950	RECEIVED QUANTITY	RECEIVED COST	UNIT COST	USED QUANTITY	USED COST	INVENTORY UNIT	INVENTORY QUANTITY	INVENTORY VALUE
1/2	INVENTORY					0.00	0000	00 00
1/3				00	0 00		0000	0 00
1/4				00	0 00		0000	0 00
1/5	0000	00 00	0.00			0.00	0000	00 00
1/6	VARIANCE (PRICE)			00	0 00	0.00	0000	00 00
1/7				00	0 00		0000	00 00
1/7	VARIANCE (QUANTITY)			00	0 00		0000	00 00
1/31					0 00	0.00	0000	000 00

LEDGER

ACCOUNT – NO. _____ NAME _____

DATE	EXPLANATION	DEBITS	CREDITS	BALANCE
1150	INVENTORY AT START OF SYSTEM			$ 000.00
1 31	PURCHASES FOR THE MONTH	$ 000.00		
1 31	USED IN JANUARY		$ 000.00	$ 000.00

COMPARATIVE STATEMENT
(SEE DIA. 5)

having been piled by itself when unloaded, is identified by painting the car number on one of the pigs, or preferably by painting the car number on a board placed on the pile.

1. The pigs in each pile are counted.

2. Ten pigs are weighed to determine the average weight per pig.

3. The number of pigs in each pile is multiplied by the average weight per pig and the result entered on the metal cost card.

4. Referring to the purchase invoice for this particular car of pig iron, the purchase price per pound is calculated. The pounds of inventory is then multiplied by this price per pound, and the result entered as "Invoice" on the metal cost card.

5. Referring to the freight bill for this particular car of pig iron, the cost per pound is calculated. The pounds of inventory is then multiplied by this price per pound and the result entered as "Freight" on the metal cost card.

6. A record of labor cost to unload each car of pig iron is kept. The cost to unload the car is divided by the pounds in the car, giving the cost per pound to unload. The pounds of pig iron on hand is multiplied by this cost per pound to unload and result of this computation entered as "Unload" on the metal cost card.

Adding the invoice, freight and unloading cost results in the total cost of the pig iron on hand which is entered in the "Cost" column of the metal cost card.

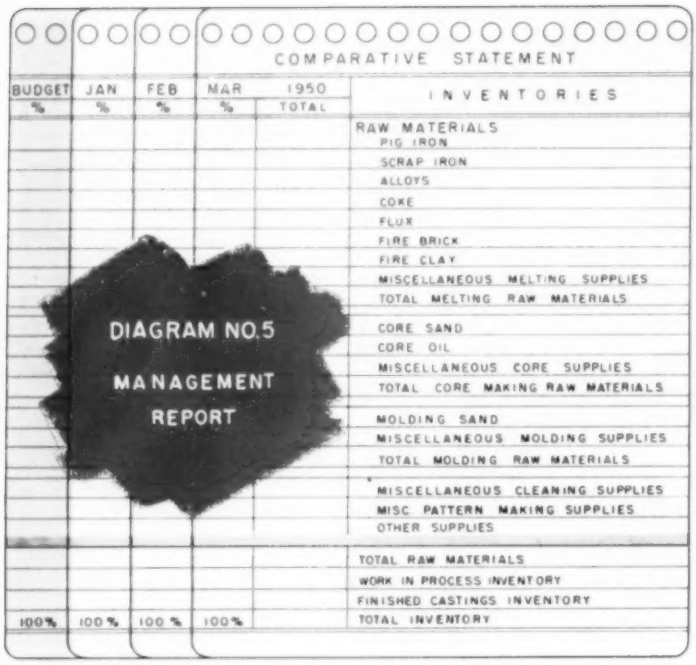
The "Analysis" section of the metal cost card is used only when desired.

Scrap iron and alloys are weighed and the weights recorded on metal cost cards for each grade. Referring to the purchase invoices for the latest receipts of metal, the cost per pound is determined, which multiplied by the pounds of inventory gives the invoice cost to be entered as "Invoice" on the metal cost card. A normal cost per pound for freight and unloading is determined, and these per-pound costs multiplied by the pounds of inventory are entered in the designated spaces on the metal cost card.

Adding the invoice, freight and unloading costs results in the total cost of metals on hand which is entered in the "Cost" column of the metal cost card.

When the cost of all metals on hand have been recorded on the metal cost cards, the cost amounts shown are added and the sum obtained entered as "balance" on the "ledger" sheet for purchased metals (Fig. 2).

Purchasing Metals—A metal cost card is prepared



for each receipt of metals, entering thereon the car number, date received, kind of metal, from whom received, analysis, pounds received, costs of metal, freight and unloading. This information comes from the supplier's invoice, the freight bill and the record of cost to unload.

The sum of invoice, freight and unload is the cost of the metal which is entered in the "Cost" column of the metal cost card.

At the beginning of the fiscal year a "Metal Purchases" control sheet is prepared (see shaded part of Fig. 4). Sufficient lines are provided on this control sheet to allow for monthly entries. At the beginning of each month, a "Metal Purchases" control sheet is prepared (Fig. 4). Sufficient lines are provided to allow for daily entries of summarized costs of (a) invoice cost of metals; (b) freight, unloading.

After the summarized entries to the monthly metal purchases control sheet have been made, the sum of the invoice, freight and unload amounts is entered in the "Charge" column of the control sheet.

At the close of the month, the invoice, freight and unloading are totaled and the sum of these totals entered in the "Charge" column of the metal purchases control sheet. This charge amount then forms the basis for the debit to the "Purchased Metals" general ledger account.

The monthly metal purchases control sheet is then superimposed on the yearly control sheet in the multiple ring binder (Fig. 4). The metal cost cards are filed pending entries covering records of metals used.

Metal Usage and Costs—A supply of "Metals Used" card (Fig. 5, Diagram 3) are prepared for each separate kind of mixture showing: Mixture number; analysis of metal; weight of pig iron in one charge, weight of alloy in one charge, purchased scrap in one charge, weight of coke for melting one charge, weight of flux for one charge; kind of alloy. These cards are used to tally the number of heats for a day's operation using a separate card for each separate mixture. These cards show a complete record.

Each charge is recorded by making a straight perpendicular line in the "tally" section of the card. The illustrated recording shows eight charges in the day, five in the first (5) block and three in the (10) block. The car number designating the stock pile from which the metal was taken is entered in the space provided, the cards being turned in by the cupola tender at the close of each day's operation.

The weight of one charge for pig iron, alloy, purchased scrap, home scrap, coke, flux, is multiplied by the total number of heats (tally) entering the results on the bottom (total weight) line of the metals used card.

Cards Show Metal Used Per Month

At stated periods, usually one month, these metals used cards are accumulated and the weights of each kind of metal shown are added and the total of each entered on the "used" line of the metal cost card (11,510 lb, Fig. 6).

This amount is then deducted from the inventoried weight (36,000 lb) the remainder (24,490 lb) is multiplied by the cost per pound ($0.214) and the resultant amount ($524.09) entered on the "balance" line and in the "cost" column of the metal cost card, Fig. 1. This amount is then deducted from the cost ($770.00) of the original inventory, entering the remainder ($245.91) on the "used" line and in the "cost" column of the metal cost card, Fig. 1.

The pounds used (11,510) is multiplied by the price per pound ($0.214) to prove all calculations concerning the transaction. In this example the result of multiplication is $246.31, which is 40 cents more than "used" cost shown on the metals cost card. This variance is caused by carrying the cost per pound in the original inventory entry to four decimal places only. The variance amount is so small in proportion to the total involved that it is disregarded.

The same procedure is employed where purchases are recorded on metal cost cards, (Fig. 3 of Diagram 2). Subsequent entries for metal used are made in like manner until the metals originally recorded on the metal cost cards have been exhausted.

Records and calculations of costs for alloys, purchased scrap, coke and flux are made in the same manner as for pig iron.

The sum of all calculated costs of purchased metals, used in the month (shown in cost column Fig. 3 of Diagram 2) is credited to Purchased Metals account, (Fig. 2 of diagram 1). The value of purchased metals on hand is then determined as follows: Balance at first of month ($45,164.00) plus purchased metals received during the month ($20,942.58) equals total of $66,106.58, the inventory if none had been used during the month; however, $39,006.00 worth of metals was used during the month which must be deducted. This leaves a balance of $27,100.58, as shown in the "Balance" column of the ledger sheet.

Many foundries do not remelt gates, sprues, over iron and defective castings the day after they are produced. This practice suggests the maintenance of a ledger account, Fig. 7. This account was started with a balance of $500, representing the value at cur-

rent market price of this grade of home scrap on hand at the start of the system.

During the month $10,588.77 worth of home scrap was produced. This amount added to the $500 worth on hand at the start of the month is $11,088.77. This amount less the $10,368.00 credited for the value of home scrap used, leaves an inventory balance of $720.77, as shown in the "balance" column of the ledger sheet.

Miscellaneous Materials and Supplies—A "Material Record" is maintained for each kind of material. At the start of the system a physical inventory is taken and the quantity of each item entered in the "Inventory" section of the record. The current market price is ascertained and entered in the "Unit" column of the "Inventory" section of the record. The quantity on hand, shown in the "Quantity" column, is multiplied by the unit price and the result entered in the "Value" column of the record.

Several methods that may be used successfully to record quantities used:

Method 1—A store's requisition is issued for each delivery from the stores room, the quantity being entered daily in the "Quantity" column of the "Used" section of the material record. The costing formula is:

Inventory	100,000 lb valued at	$10,000.00
Less Used	1,000	100.00
New Inventory	99,000 lb	$9,900.00

Method 2—A stores requisition is issued for each delivery from the stores room, the quantity being entered daily in the "Quantity" column of the "Used" section of the material record. The costing formula is:

Inventory	100,000 lb
Less Used	1,000
New Inventory	99,000 lb

This procedure is continued until the end of the accounting period, when the several requisitions are costed and a new inventory determined. This costing formula is: Total Used Quantities × Unit Price (25,000 lb × 10 cents) = $2500.00.

Inventory	100,000 lb valued at	$10,000.00
Less Used	25,000	2,500.00
New Inventory	75,000 lb	$7,500.00

Method 3—No stores requisitions are issued. A physical inventory is taken of each kind of material at the close of the accounting period (usually one month). The costing formula is:

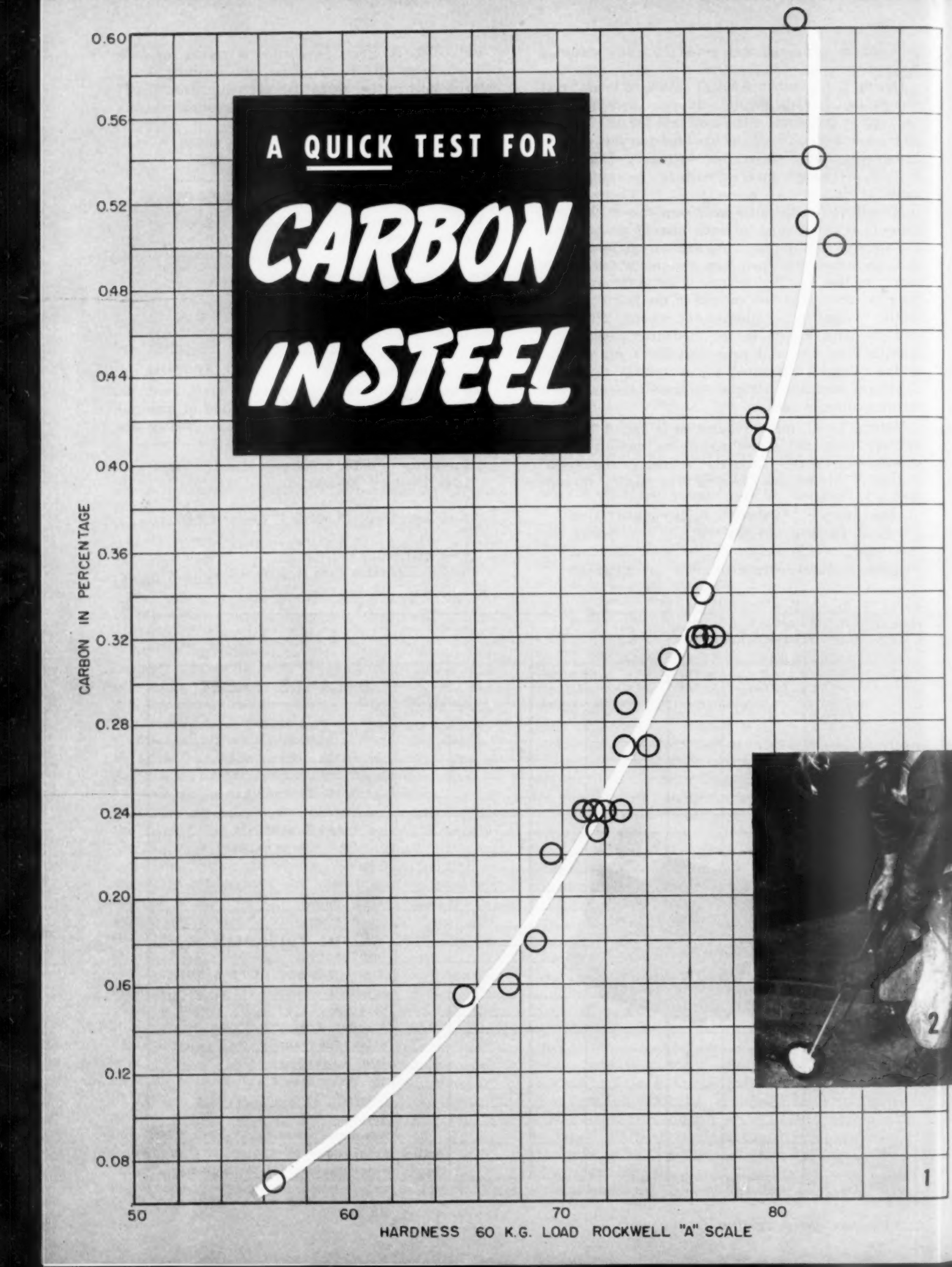
Inventory	100,000 lb valued at	$10,000.00
Less Used	25,000	
New Inventory	75,000 lb @ 10c/unit	7,500.00
Cost of Used		$2,500.00

(*Please turn to page* 125)

TOTAL	% TO TOTAL	TOTAL	% TO TOTAL	TOTAL	% TO TOTAL	TOTAL	% TO TOTAL CAPITAL	BALANCE SHEET
								ASSETS
								CURRENT
$	$	$		$		$		Cash
								Accounts Receivable
								Notes Receivable
								Inventories
								Prepaid Expenses
$		$		$		$		Total Current Assets
								FIXED
$		$				$		Land
								Buildings
								Equipment
$		$				$		Total Fixed Assets
$		$				$		Total Assets
								LIABILITIES
$		$				$		Accounts Payable
								Notes Payable
								Accrued Payroll
								Accrued Expenses
$		$		$		$		Total Liabilities
								CAPITAL
$		$		$		$		Capital Stock
								Surplus
								Undivided Profits
$		$		$		$	100%	Total Capital
$		$		$		$		Total Liabilities & Capital
BUDGET		1 St. QUARTER		2nd. QUARTER		3rd. QUARTER		

DIAGRAM NO.6
MANAGEMENT REPORT

A QUICK TEST FOR CARBON IN STEEL



1

By YUN-LUAN SUN

CARBON control is an important consideration when producing steel in the electric furnace. Carbon may be reduced by the iron oxide in the charge, by addition of iron ore, by bubbling oxygen through the bath, or by contact with air. Carbon content of the metal bath may be increased by dipping the electrodes, by addition of graphite or broken electrodes to the furnace. The skill of the furnaceman consists to a large extent in his ability to control the carbon content of the steel.

Since the carbon content of the bath may change quickly, it is desirable to have a rapid method for determining carbon content. At the foundry of William Kennedy & Sons, Ltd., Owen Sound, Ont., several methods for determining carbon were tried, and the one that has proved to be the most promising is a Rockwell hardness test on a quenched specimen.

The hardness test has proved to be both fast and accurate. In addition, the cost of the equipment used for this test method is low.

Several methods of carbon analysis currently are practiced in steel plants: (1) fracture method, (2) magnetic analysis carbometer, (3) gravimetric carbon analysis, (4) volumetric carbon analysis.

1. **Fracture**—This is the simplest method to predict carbon. It shows the tendency of high carbon or low carbon by fracture. It is difficult to read accurately by an inexperienced man and sometimes confusion is introduced by the presence of the residual alloy contents.

2. **Magnetic**—This method is based on magnetic properties of a steel with respect to its carbon content. The instrument must be standardized against each type of steel produced. Some residual alloys in various amount present in scrap may affect the reference curve. The magnetic analysis method is preferred when the supply of scrap is of uniform quality and only one or two types of steel are produced.

3. **Gravimetric**—This method involves direct combustion of steel in oxygen followed by absorption of carbon dioxide in soda-asbestos (ascarite). This method is considered to be very accurate.

4. **Volumetric Carbon**—This method is based upon volumetric determination of CO_2 resulting from combustion of the steel sample. It gives very accurate results, and requires less time than the gravimetric procedure.

Carbon by Hardness—The present method is based upon the principle that the maximum hardness of the untempered martensite bears a direct relationship to the carbon content irrespective of small amount of alloys present in the steel. Clark and Kowall described this procedure in 1944 (*Transactions*, AIME). In applying this method the first problem is to select a sample which will be properly quenched to give maximum hardness. Following is the writer's method:

A spoonful of steel was taken out and deoxidized with a small amount of CaSi. The furnace helper sucked up the rod specimens in a 2.25-mm-ID pyrex glass tube by squeezing a rubber bulb attached to the end of the tube (Fig. 2). The glass is removed and the rod placed for 20-30 seconds in a tubular furnace (Fig. 3) at a temperature of 2200° F. The rod was quickly pulled from the furnace by means of a piece of Ni-Cr resistance wire attached to one end and immediately quenched in water. This quenched rod was clamped into a 1 x 1 x 2½ in. rectangular steel block by a set screw with the 1 x 2½ in. surface resting upon the (*Please turn to page* 220)

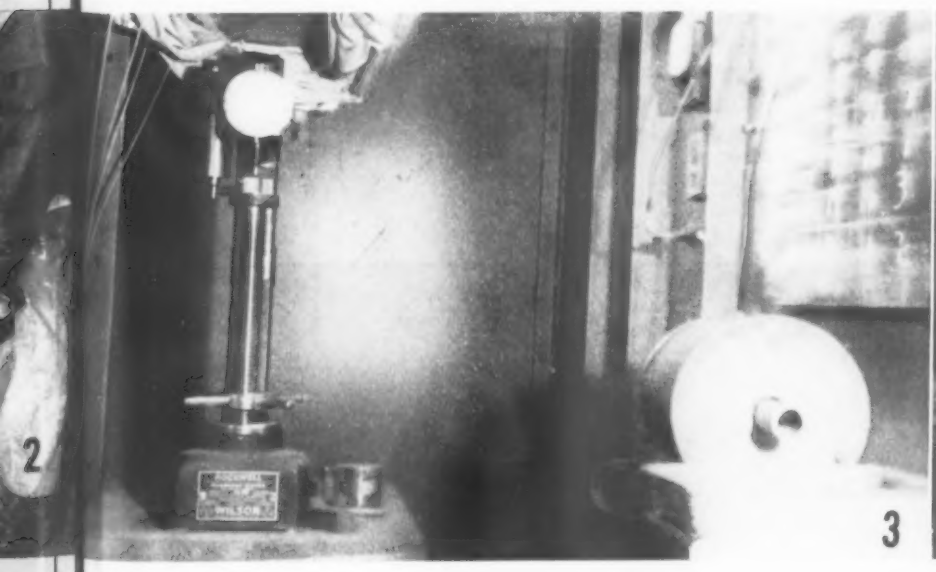


Fig. 1—Chart showing relationship between hardness and carbon content of cast steel
Fig. 2—Collecting steel sample by means of rubber bulb attached to glass tube

Fig. 3—Hardness tester and furnace used to bring steel sample to 2200° F before quenching
Fig. 4—Grinding the cast steel sample to obtain two parallel surfaces

Which Molding

THE ANGLE plate gray iron casting illustrated in the accompanying sketches measures 5 x 8 ft both vertically and horizontally, with 4-in. section thickness. It may be molded according to any one of several different methods. Many features are common to all methods; the difference lies in the details. Method of gating, risering, molding and pouring will depend to a great extent on existing shop facilities, and to some extent on the experience of the personnel. Where ample facilities are available, including cupola, ladles, cranes and flasks, the job might be handled in one way. Where all the facilities are not available, the foundryman has to scratch his head and adapt himself to conditions.

For example, the casting might be molded in a flask, or in a pit in the floor. The flask eliminates the necessity for using binder bars or weights. When the mold is made in a temporary pit in the floor, without a foundation plate to which the cope may be bolted, it will be necessary to place about 10 tons of weights on the cope. Many foundries do not have 10 tons of weights lying around idle.

At first glance the experienced molder will decide the casting should be made in a dry sand mold baked in the oven. The decision reflects sound judgment where the facilities are available. However, the opinion and suggestion, excellent in themselves, are of no practical service in foundries not equipped with an oven large enough to take a flask approximately

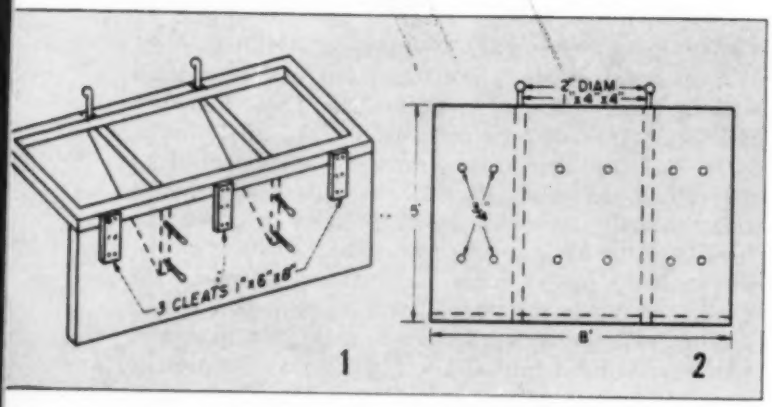


Fig. 1—Pattern parts are held together with cleats and wood pins. Fig. 2—Gates may be at side or top

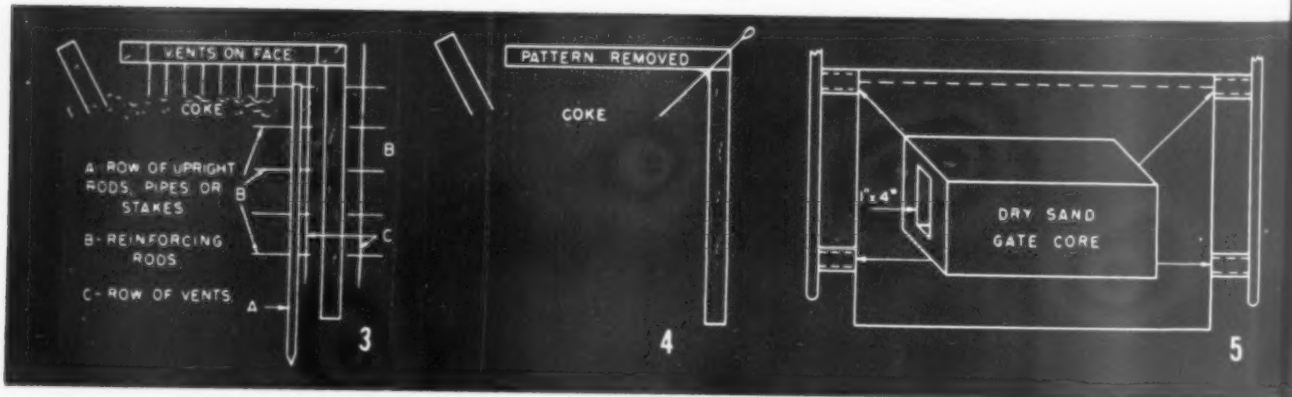
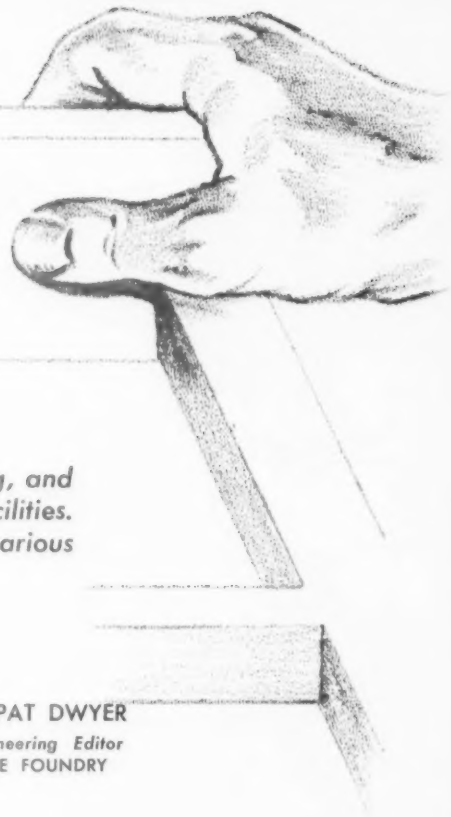


Fig. 3—Details of vents, reinforcing rods, stakes. Fig. 4—Upper sand corner is vented by a wire

Fig. 5—Dry sand gate cores, one near bottom and one near top at each end, conduct metal to mold

g Method?



Several different methods may be employed to mold a given casting, and the one selected will depend to a great extent on existing shop facilities. Experience of the personnel also is a factor. The author discusses various alternate procedures in molding a specific casting

By PAT DWYER
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THE FOUNDRY

7 ft wide, 6 ft deep and 10 ft in length on the inside. Clearance for the flask handles will add another 2 ft to the oven width.

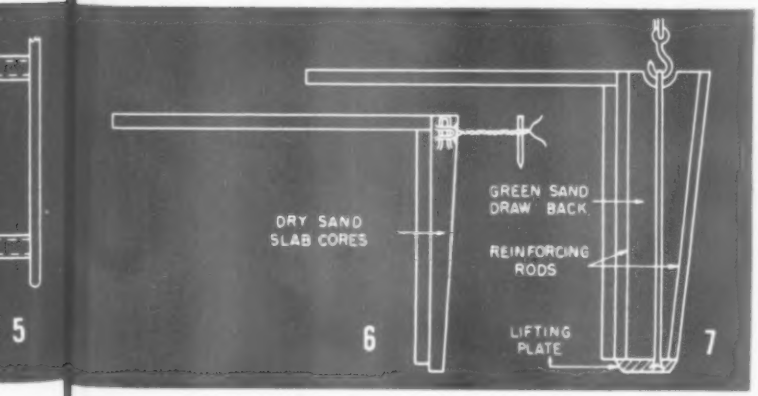
The casting can be made in a green sand mold in the floor provided proper precautions are observed, and provided the sand is properly permeable and highly refractory. Suitable sands are available in several parts of this country, and are used extensively by foundries engaged in the production of heavy castings in green sand molds. Where the combination of distance and cost prevents a foundryman from employing sand of this character, he would be ill advised to attempt the mold in an inferior grade. A rough, scabby, dirty surface does not appeal to a customer.

Minor objection to the simplest molding method is that it is practically impossible to apply a plumbago coating to the deep vertical walls. Facing sand containing approximately 12 per cent coal dust—or to use the usual foundry term, 1 to 8—will peel fairly clean from the casting. The upper flat face in the drag may be covered with wet or dry blacking. If applied as a wash—blacking mixed with molasses water—the face may be skin dried with an oil or gas torch, or with a coke, charcoal or wood fire. Next to a dry sand mold, a skin-dried mold is a fairly reliable insurance against buckles, washes or scabs. Method for black washing and drying the vertical walls will be described later.

Skin drying the drag face is optional, but it is practically imperative to blackwash and skin dry the cope face to prevent patches of sand from pulling down. In another method large dry sand slab cores may serve for a cope. The cope face is exposed for a comparatively long period to intense heat while the metal is filling the large thick plate. The mold should be filled rapidly, and for that reason the metal should be poured from two ladles, one at each side or one at each end. In the first method, shown in Fig. 2, the metal is poured from the two sides.

Metal from one ladle entering the mold from two deep narrow gates opposite the brackets should be poured first, slowly until the vertical plate is filled about half way, and then as rapidly as the gates will take it. A piece of slab core, 12 x 12 in., is placed against the pattern face where the first metal strikes. The second ladle is brought into action when the metal in the vertical member reaches the level of the horizontal plate. Metal from the second ladle is poured into a long basin with two lateral members that feed twelve ¾-in. diam pop gates, spaced approximately on 2-ft centers. Combination of side and top gates will fill the mold more rapidly than any other combination. A 2-in. diam riser and flow off at each of the four corners will indicate when the mold is full of metal, and also will serve to drain the surplus metal from the pouring basins.

Some foundrymen will object to the pop gating method shown in Fig. 2. They will claim that it involves a considerable (*Please turn to page* 126)



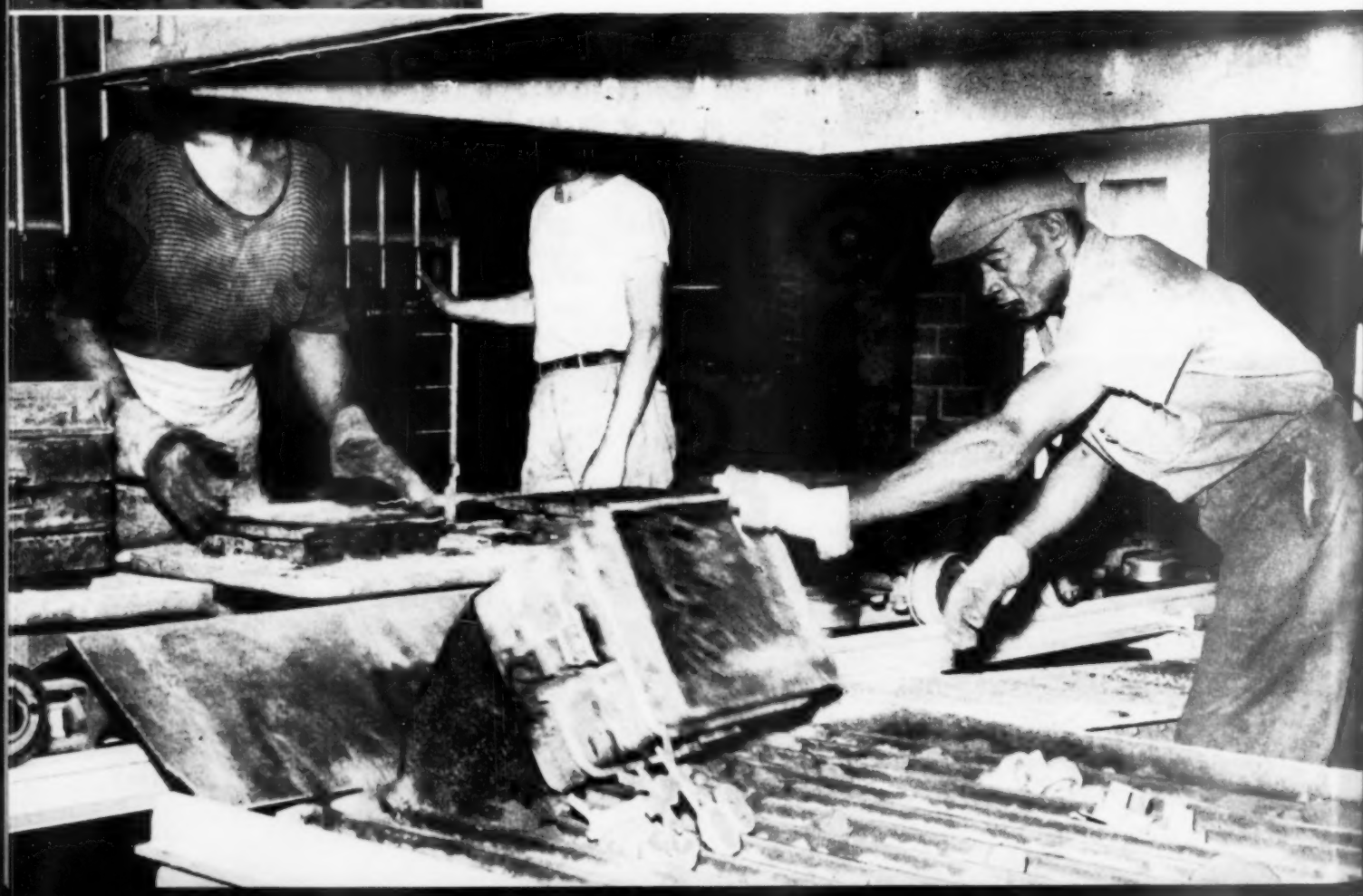
Figs. 6, 7—Back face of vertical member may be formed with dry sand cores or green sand drawback

Equipment used in handling materials at the shakeout is discussed in this sixth of a series of articles dealing with flow of materials in foundry operations. Previous articles dealt with equipment for handling materials in the foundry yard, in furnace charging, in the molding and coreroom departments, and in metal pouring

HANDLING MATERIALS

AT THE SHAKEOUT

Fig. 1 (left)—Electric chain hoist being used for shakeout work in a brass foundry. Fig. 2 (below)—Shakeout station on a car mold conveyor line



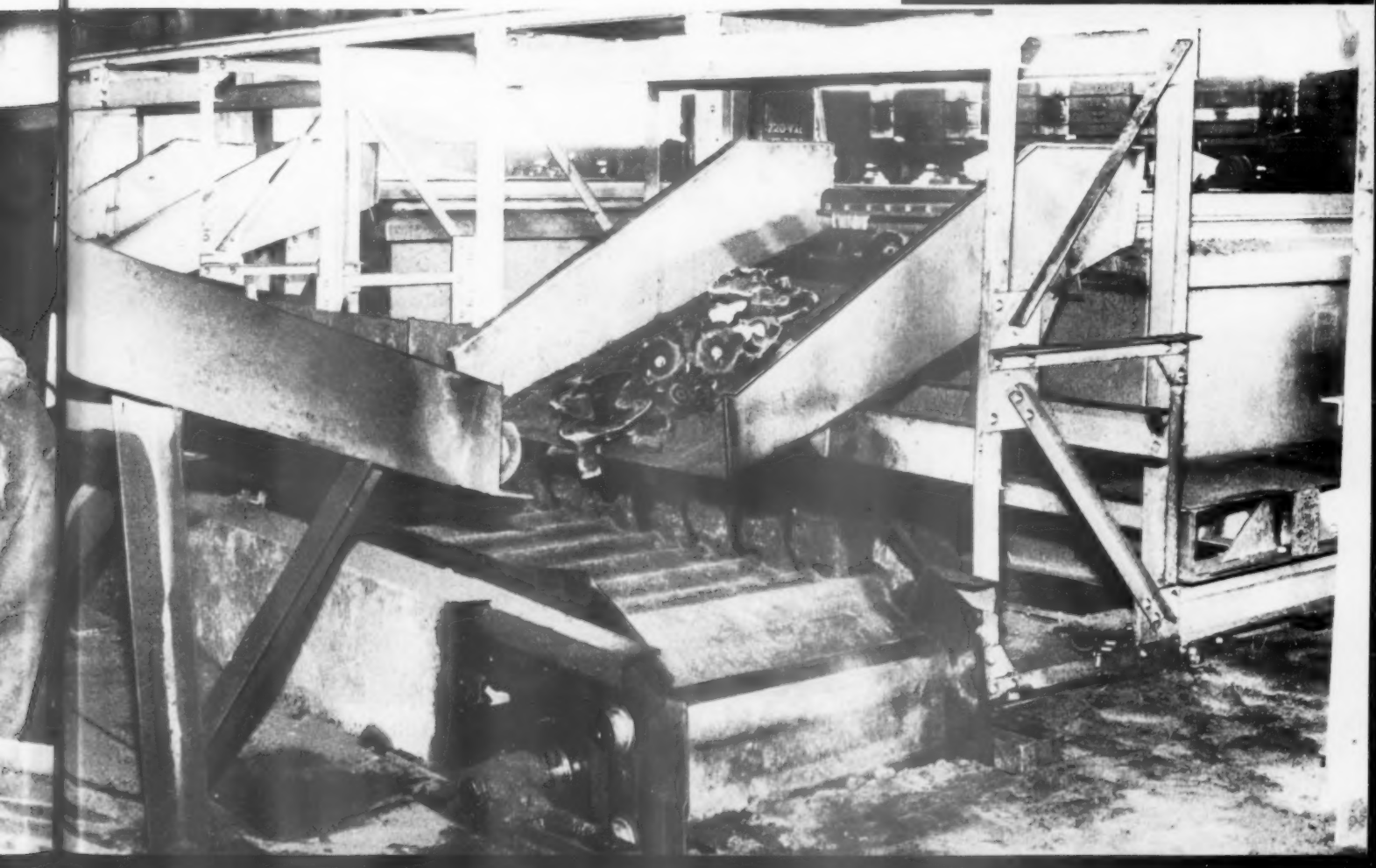
By ROBERT H. HERRMANN
Associate Editor
THE FOUNDRY

TYPE of equipment suitable for moving materials to and from the shakeout department, and the extent to which that department can be mechanized, depend largely on the type of castings made, the volume of work, and whether or not molds are poured continuously. Obviously, extensive mechanization would be uneconomical in a foundry where volume is small or intermittent or where castings are so large their movement is difficult.

Yet many types of handling equipment designed for use in shakeout operations are available. Foundries of all sizes can find equipment which will fit in with their plans for economical and smooth flow of materials in production. Many of the handling systems employed by foundries provide for the uninterrupted movement of castings and sand from the time the molds are poured until the castings reach the cleaning room and the sand is returned to storage. Such systems usually provide for carrying poured molds by any one of a number of different types of conveyors to an automatic shakeout. Sand then is conveyed from shakeout to storage, first being screened and generally passing through a magnetic separator to remove tramp iron. Castings are conveyed from the automatic shakeout to the cleaning department.

Other types of equipment, while they do not provide for uninterrupted flow of sand and castings, are designed to relieve manual labor involved in the shakeout operation. Equipment in this latter group

Fig. 3 (right)—Air hoist with air-powered vibrator shaking out castings in piston ring foundry. Fig. 4 (below)—Vibrating shakeout discharges castings to apron conveyor for movement to cutoff and grinding area



is shown in Figs. 1 and 3. These illustrations show application of hoists to shakeout duty—another example of the versatility of hoists in the foundry, particularly when they are mounted on overhead monorails which provides the mobility for maximum hoist utility.

The 1-ton electric chain hoist shown in Fig. 1 is mounted on a wall bracket crane. As indicated, it performs a shakeout operation in a brass foundry simply by pulling castings from the molds. Fig. 3 shows an air hoist used in conjunction with a compressed air vibrator to shake out castings in a piston ring foundry. The hoist pictured here is of 300-lb capacity; other air hoists listed by the manufacturer range in capacities from 200 to 20,000 lb.

The shakeout station on a car mold conveyor line is shown in Fig. 2. An operator pushes a mold off the conveyor onto the vibrating grate shakeout. When the casting is shaken out, another operator places the flask back on the car conveyor which circles around to the molding area. Molding machine operators remove the flasks, placing completed molds on the conveyor. The conveyor continues to the pouring area and then to shakeout to complete the loop. A section of the dust exhaust hood mounted over the shakeout can be seen in Fig. 2.

The discharge end of the vibrating shakeout is shown in Fig. 4. Castings are shaken off the end of the grate to a chute which leads to a 36-in. wide apron conveyor. This conveyor serves as a sorting line from which castings are separated and placed in containers for movement to the cleaning and finishing departments. The sand drops through the shakeout grating onto an inclined conveyor belt which elevates it to storage bins. Sand is drawn from the storage bins as required, reconditioned and returned to the hoppers located above the molding machines.

Fig. 5 illustrates automatic dumping of molds onto a vibrating shakeout. Rollers at one side of tilting tops on the conveyor cars ride on a dumping cam shown in the center of the photograph. Metal fingers protrude above the car top on the side opposite the rollers and hold the bottom board in place when the top is tilted to dump the mold. An exhaust hood above the shakeout removes dust and fumes released during the shakeout operation.

Fig. 7 is a good view of conveyorized handling of molds to the shakeout and castings and sand away from the shakeout. At top center of the photo, molds can be seen emerging from a ventilated cooling hood on a car type mold conveyor. At right is the shakeout equipped with dust and fume exhaust hood. Castings can be seen falling onto an apron conveyor from the shakeout. The belt conveyor carrying sand away from beneath the vibrating shakeout is shown at upper left between the apron conveyor and the cooling hood.

View of another automatic dump mold conveyor is shown in Fig. 8. In this installation two molds are carried on each of the tilting tops, and both molds are dumped at once. Pegs at the hinged side of the top to hold the bottom boards in place are visible on the conveyor top in the foreground. An apron conveyor mounted below floor level is shown in Fig. 6, carrying sand away from a shakeout.

Fig. 9 shows the cooling area and shakeout in a train conveyor system. This installation consists of four individually motivated trains which are arranged for automatic operation. The trains index at predetermined intervals, with each train passing the molding, pouring, cooling and shakeout zones, respec-

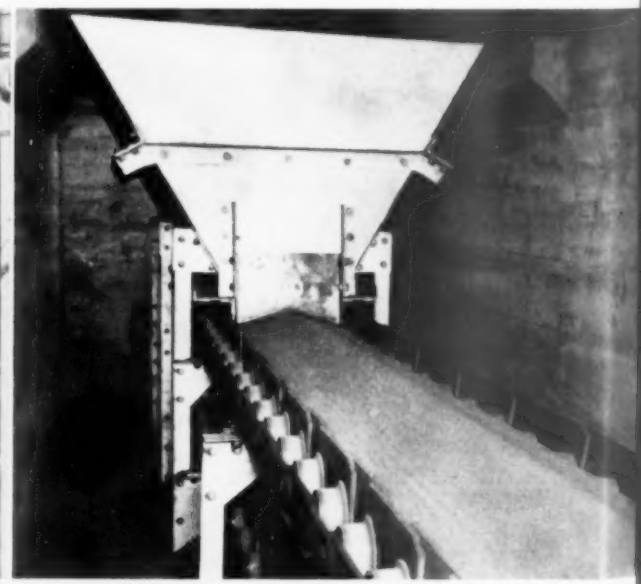


Fig. 5 (left)—Cam arrangement automatically dumps molds from tilting top car conveyor. Fig. 6 (right)—Below-the-floor apron conveyor removes shakeout sand

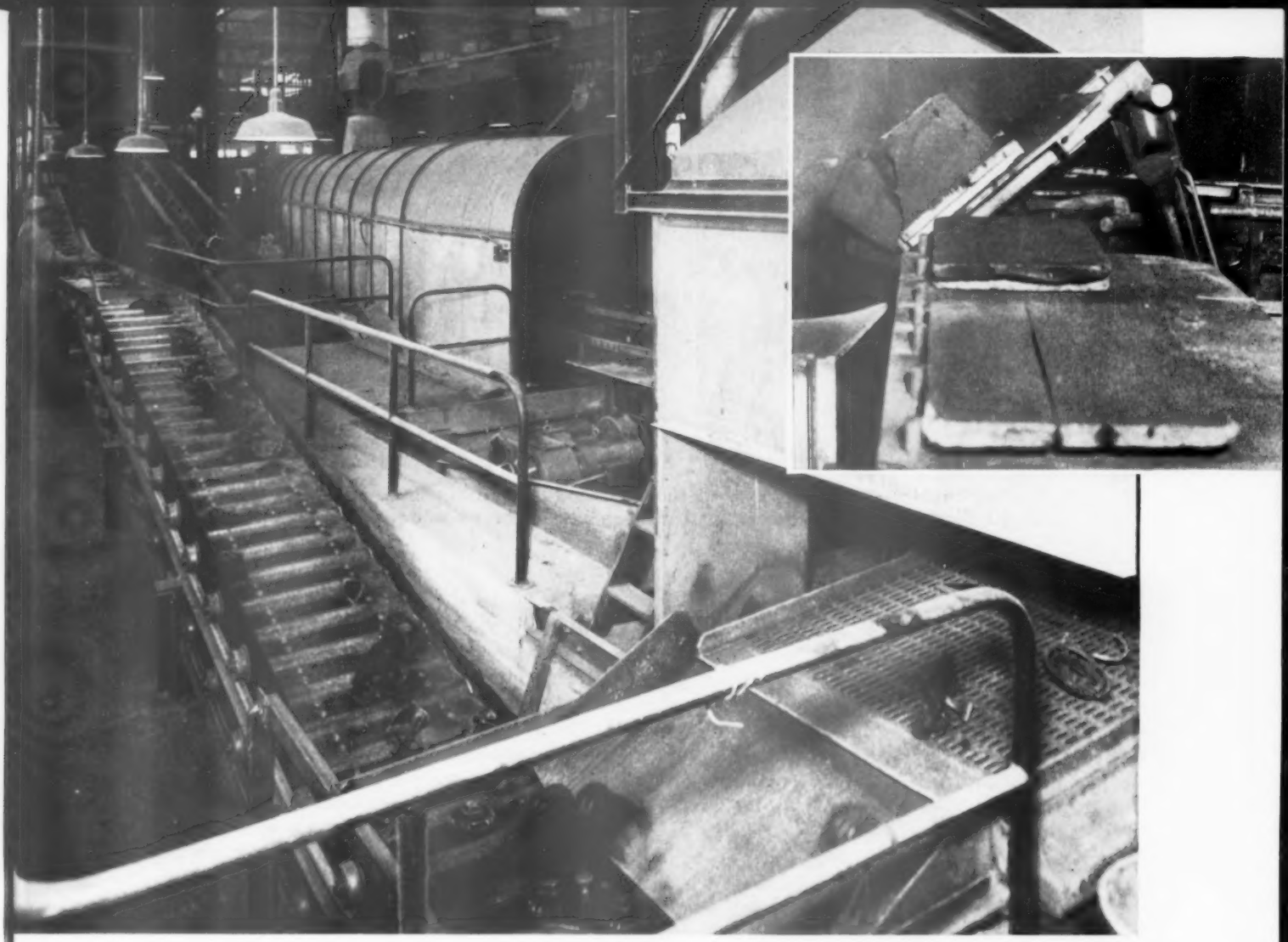


Fig. 7 (above)—View of conveyorized handling of molds to the shakeout and castings and sand away from the shakeout. Fig. 8 (inset)—Automatic dump mold conveyor

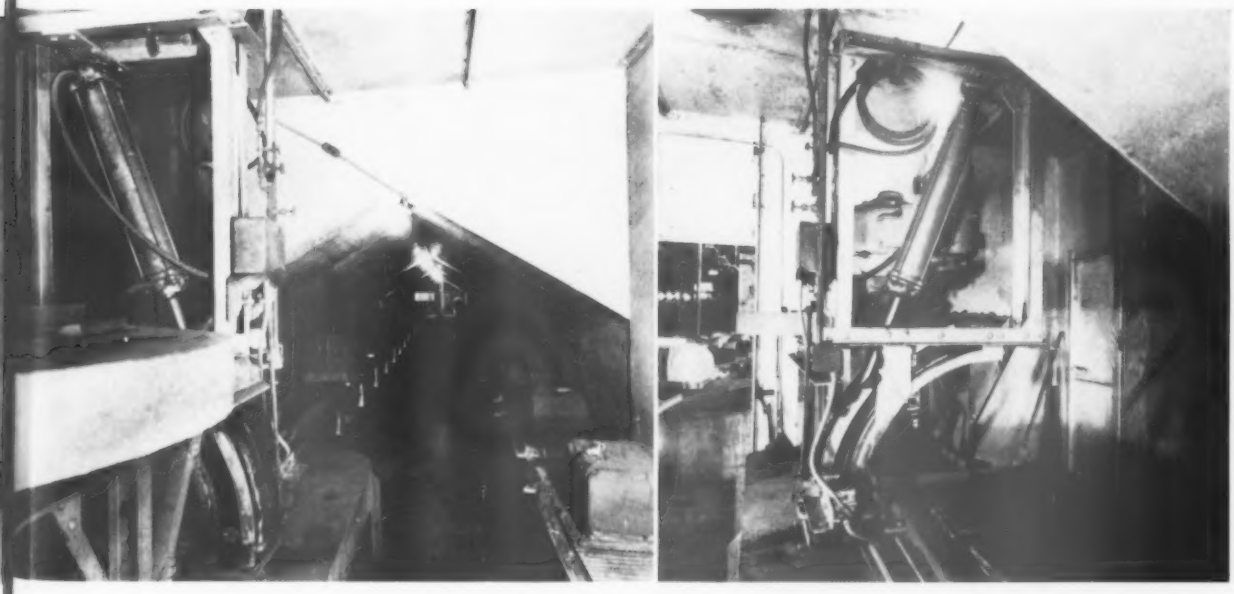


Fig. 9 (left)—Cooling area in a train conveyor system. Fig. 10 (right)—Automatic mold-dumping device for conveyor shown in Fig. 9

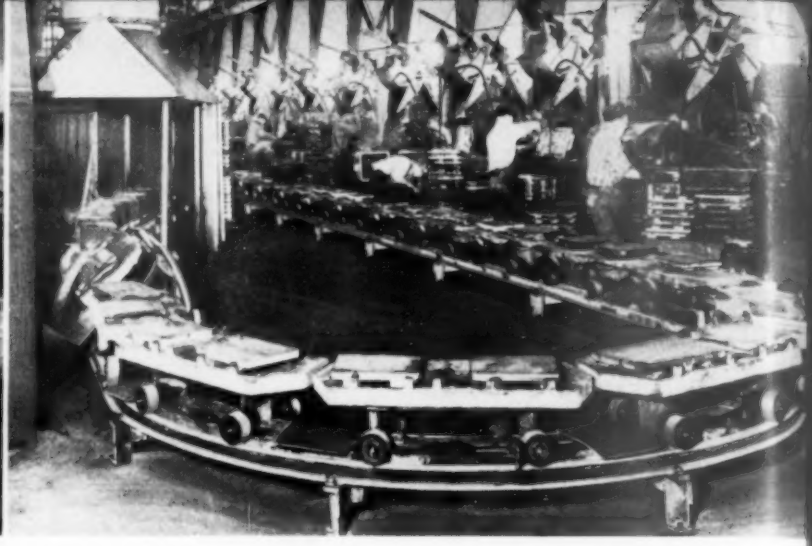


Fig. 11 (left)—Belt conveyor carries hot sand and castings to vibrating shakeout. Fig. 12 (right)—Cooling, shakeout, and molding operations on a power mold conveyor

HANDLING MATERIALS

tively. The indexing cycle can be altered to meet production and operating requirements. The trains are stationary at molding and pouring stations and, because of the automatic indexing, the same mold car is returned to each molder, providing him with the same equipment at all times. Each of the cars is equipped with a tilting top, permitting automatic mold dumping at the vibrating shakeout.

In Fig. 9 the train at right is entering the cooling zone. The train on the left is ready to enter the

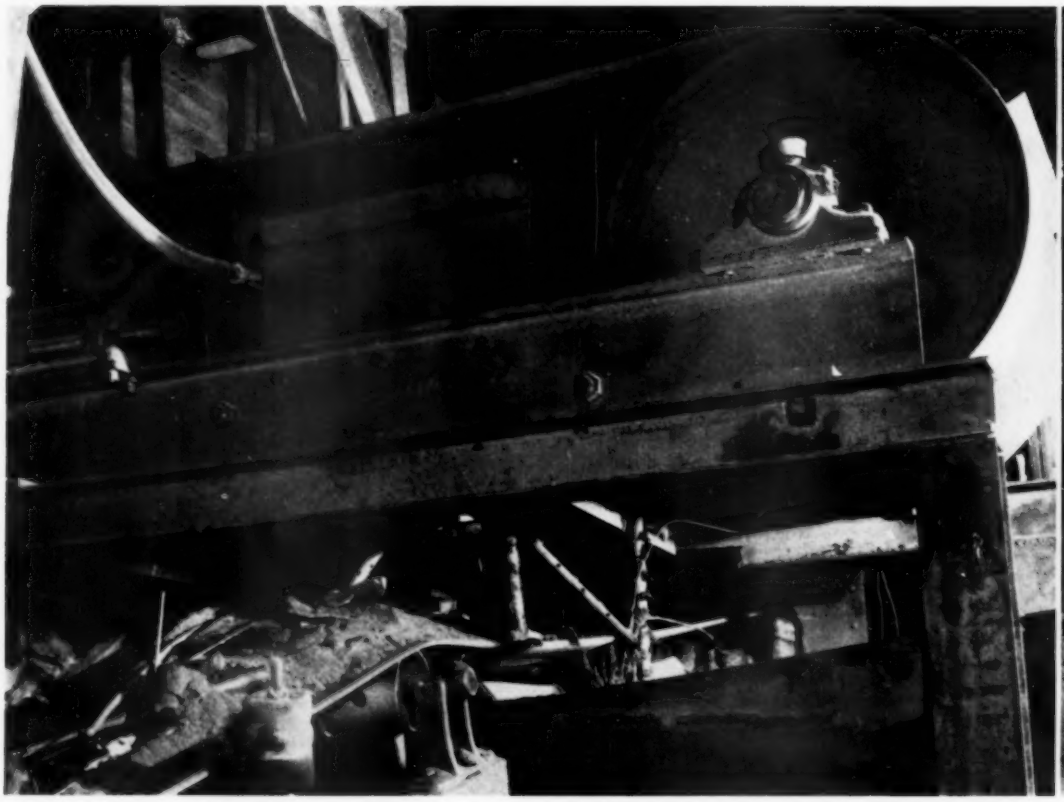


Fig. 13 (left)—Self-cleaning electro-magnet removes tramp iron from shakeout sand. Fig. 14 (right)—Mobile swing boom crane carries skid box load of castings

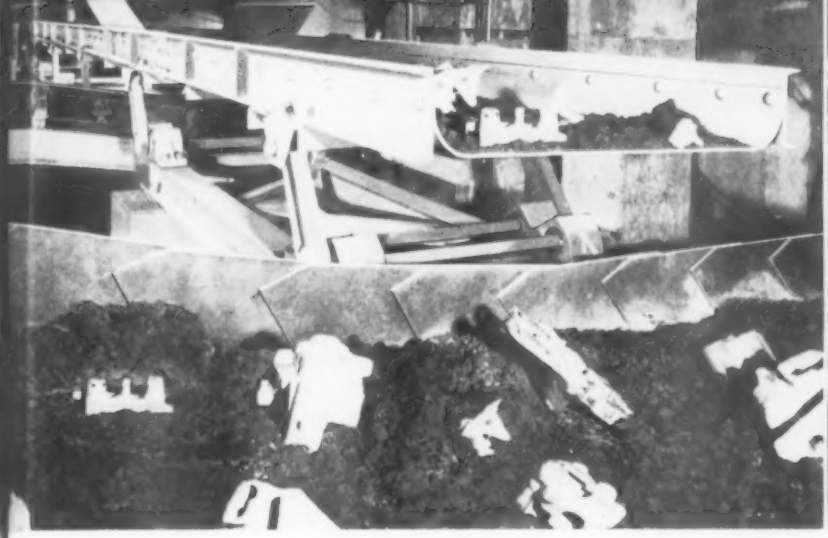
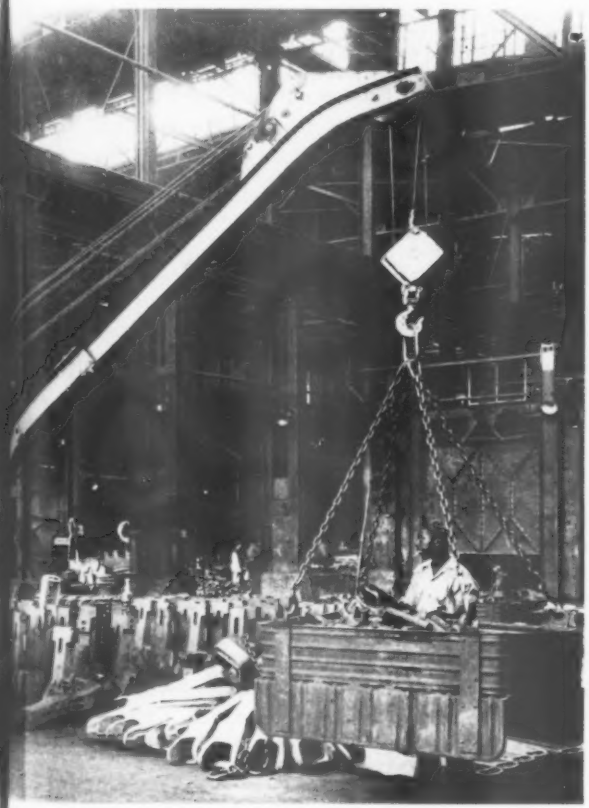


Fig. 15 (left)—Oscillating conveyor carries hot sand and castings. Fig. 16 (right)—Overhead trolley conveyor transports castings away from shakeout

shakeout zone. A close-up of the device for automatically dumping molds onto the vibrating shakeout is shown in Fig. 10.

Use of a belt conveyor for carrying hot sand and castings to a vibrating shakeout is shown in Fig. 11. The conveyor in this installation is 225 ft long and 36 in. wide. It is made of eight-ply woven duck impregnated with special insulation materials, and is designed to withstand temperatures up to 600° F. In the installation pictured here, the conveyor was in service more than 90 days without a shutdown chargeable to the belt conveyor. The plant in which the conveyor is installed operates on a 16-hr daily schedule, and the cost of shutdowns at this particular point was estimated to be $750 per hour before installation of the new belt.



View of another car type mold conveyor with cam and roller type unit for dumping molds automatically onto a vibrating shakeout is shown in Fig. 12. The conveyor illustrated is designed for handling both large and small snap flask molds in irregular paths and up and down inclines. As shown, the conveyor passes through a ventilating hood to the shakeout where the molds are dumped automatically, then continues around to the molding area.

Fig. 15 shows an oscillating conveyor in a tunnel under the floor of a mechanized malleable iron foundry, delivering hot sand and castings to an overlapping steel apron conveyor for transfer to shakeout screen. The oscillating conveyor is a positive-action, roller bearing, eccentric type trough feeder conveyor designed to handle a wide variety of material in a horizontal path. It is available in standard trough widths of 12 to 48 in. to suit the capacity desired and character of material to be handled, and in single trough lengths up to 100 ft.

For longer carrying runs, two or more units may be arranged in series, one discharging into the other, and each equipped with an individual motor drive. The trough is either pan type or constructed with channel steel sides. The standard trough is leakproof and can be furnished with dust-tight covers or constructed for air and gas-tight movement of the material. Conveyor trough also can be fabricated of corrosion and heat resistant metals.

Magnetic equipment for removing tramp ferrous metal from shakeout sand is used extensively in foundry cleaning rooms. This equipment includes pulley type separators and other types of magnets.

Removal of tramp iron from sand with a self-cleaning rectangular electromagnet is shown in Fig. 13. This magnet, installed in a (*Please turn to page* 229)

Questions AND

Wants Metal Mold for Bronze

Q.—Can you give us any information on a suitable composition for making chill or permanent molds into which brass and bronze can be cast without use of the pressure injection method?

A.—Brass and bronze bushings, as well as numerous other types of castings, are being produced in this country to an increasing extent by pouring into metal molds, and the process usually is termed permanent mold casting. In Great Britain and in Europe the method is called gravity die casting to distinguish it from pressure die casting. Molds are mainly gray iron, with or without alloy additions.

A wide diversity of opinion is prevalent as to the most suitable composition for molds, as indicated by the following list: Si 2.50 to 2.70 per cent, TC 3.30 to 3.50 per cent, Mn 0.60 to 0.80 per cent, and P 0.30 to 0.40 per cent; Si 1.8 to 2.0, TC 3.2 to 3.4 per cent, Mn 0.8 to 1.0 per cent, P 0.25 per cent, and Cr 0.20 per cent; Si 1.8 per cent, TC 2.9 per cent, Mn 1.0 per cent, P 0.20 per cent, Cr 0.60 per cent, Mo 0.70 per cent, and Ni 2.75 per cent; Si 3.2 per cent, TC 3.4 per cent, Mn 0.25 per cent, P 0.10 per cent, and Mo 0.60 per cent; Si 1.25 per cent, TC 3.75 per cent, Mn 1.25 per cent, and Mo 1.0 per cent.

Molds also may be made from graphite in block form. Casting cavities or impressions, as well as a gate and riser system, are tooled out of the solid. This is not difficult as graphite machines easily. High tool speed should be used to obtain smooth surfaces.

Large Flat Iron Plates Warp

Q.—We have been experiencing a great deal of trouble from warpage in making flat alloy iron plates. In an effort to overcome that difficulty we have tried various types of gating, including side gates and pencil sprue gates, without much success. While we seem to be able to reduce the warpage on a given plate, the same practice does not seem to help on a plate of slightly different size. Trouble mainly is with plates that are larger than 30 in. square and have a sectional thickness of 1 in. or less.

A.—Your problem is due to the difference in cooling rate between the edges and the center. This is not too difficut to see if you will remember that the edges of the plate are cooled on three surfaces while the center is cooled only on two. According to H. T. Angus in the December, 1949 issue of *Journal of Research and Development*, British Cast Iron Research Association, a safe empirical rule is to take the cooling rate of a free edge in a flat plate to be the same as that of a round bar of equal diameter, but the center of a large plate will only cool at the same rate as a bar whose diameter is twice the thickness of the plate.

As you mention, gating along the edge will, to some extent, reduce the warpage, but greater success will be obtained by gating along two opposite sides. This places cooler metal in the center and hotter metal at the edges. However, the general procedure is to uncover the center portion of the plate to increase the rate of cooling by exposure to the atmosphere. Another method you might try, if it is feasible, is to pour the plates in an open mold and cover the edges with dry sand, leaving the central portion bare. Still another procedure, which would require considerable experimentation, would be the use of chills covered with a thin layer of sand in the center portion.

Port Cores Cause Trouble

Q.—We are having trouble with some of the port cores in our steam engine cylinders. In the cleaning room they are difficult to remove. They do not leave clean passages. In many instances they appear to crack or open up. The metal penetrates these cracks to form fins that are difficult to remove and which, of course, cannot be allowed to remain since they would prevent normal passage of the steam. We shall appreciate an opinion on the probable cause, also the proper remedial measures.

A.—On account of the comparatively thin cross section and the crooked shape, cores in this general classification usually cause more or less trouble until a satisfactory technique is developed, usually by experiment. Probably the most extreme example is the port core in a steam hammer cylinder. This long, narrow core with the ends bent at a right angle is surrounded almost entirely by metal of fairly heavy section. Therefore it requires special treatment to prevent distortion or cracking, to provide free exit for the vent, and to facilitate ready removal of the core sand from the casting.

As a result of many experiments all three conditions were met satisfactorily by the following core sand mixture: 25 shovels coarse sharp sand; 5 shovels new molding sand; 18 shovels cleaning floor sand; 6 shovels old molding sand; 10 shovels burnt core sand; 2 shovels fire clay; 25 lb powdered rosin. Sand is measured by the shovel for convenience and on a weight basis to compare with the rosin. A shovelfull of dried sand weighs 11 lb. Actual ratio on a weight basis is 1 lb rosin to 28 lb sand. The core stands up in service, leaves a clean passage and is removed from the casting with an air jet. To prevent burning-in the core is covered with a heavy coat of wet plum-

ANSWERS

bago. In other instances of this kind some foundrymen favor the use of a silica wash as used on molds and cores in the steel foundry.

Wants Data on Pattern Metals

Q.—Can you give us the composition of pattern metals or the different metals which are used for patterns? Is there any information on how to make plastic patterns, and what type of material is used?

A.—Patterns are made from a wide variety of alloys including cast iron, brass or bronze, aluminum-base, bismuth-base, and in the past from tin-base alloys. A suitable composition for brass or bronze patterns which has good casting and machining qualities is the well-known 85-5-5-5 alloy containing 85 per cent Cu, and 5 per cent each of Sn, Pb, and Zn. Several aluminum-base alloys used with success include the 8 per cent Cu-2.5 per cent Si alloy; the 4.0 per cent Cu-3.0 per cent Si alloy, and the 5.0 per cent Cu-3.0 per cent Si alloy.

Plastic patterns generally are made from what is termed "castable" phenol formaldehyde resin. Suitable resins are supplied by a number of manufacturers, and they are in liquid form so that they can be poured into the pattern mold. Mold is made from plaster of paris or gypsum cement. After the mold cavity is filled with the resin, it is placed in an oven and heated at 350 to 450° F for several hours to polymerize or form into a solid. Manufacture of plastic patterns has been described numerous times in the literature. Articles on the subject appeared in the February and November, 1946, issues of THE FOUNDRY as well as in the February and August, 1948, issues.

Gear Blanks Lack Soundness

Q.—We are making some cast iron wheel blanks for gears and sheaves, and have trouble with them in that they show shrink or porous areas at the bottoms of the teeth or grooves as the case may be. Wheel blanks are 28 in. in diam with a rim 3 in. wide with a 4½ in face. Spokes are 5 in. wide and 1 in. thick. Hub is 4½ in. high and 8 in. in diam, cored out to 3 in. diam. We tried placing risers on top of the rim and also cutting them on the outside without result. We are using a 32-in. cupola charging 500 lb pig iron containing 2.25 per cent Si, and 500 lb return and purchased scrap.

A.—Your difficulty with shrinky or porous areas in the rim of the wheels is due to the lack of feeding from the hub through the spokes, which are much lighter in section. The spokes freeze or reach a mushy state in the center some time before the rim is completely solidified, and, without hot metal for feeding, the center of the rim exhibits voids or shrinks. Easiest remedy for the trouble, if it can be accomplished through co-operation of the designer, is to increase the thickness of the spokes sufficiently to permit feeding until the rim is solid. Perhaps if the spoke design could be changed to an elliptical shape of 2 x 2½ in. (approximately the same section as 5 x 1), it might feed to produce a solid rim. However, that would have to be determined experimentally.

Another procedure to keep the spokes open would be to form them in some type of insulating material which would slow down the rate of solidification to a satisfactory point. For example, you might try using insulating refractory brick on the cope and drag sides of the spokes, if the design will permit. If it will not, then an insulating material might be used, such as a mixture of 3 lb sawdust, 2 lb dextrine and 1¼ qt water mulled together to form a workable mass, as suggested by Power in the August, 1949 issue of THE FOUNDRY, p. 68. That material can be molded around the spokes to form cores which are dried in the oven. Dried forms are rammed up in the molding sand. Another mixture for the same purpose suggested by Boyle, Puget Sound Naval Shipyard, is composed of 3¾ lb diatomaceous earth ground to 8 mesh, 12 oz bentonite, 1 pt resin composed of 160 grams phenol formaldehyde resin and 240 grams alcohol, and 2 qt water. This material is formed over the spokes and dried in the oven before use.

Only other suggestion is to follow a method of gating suggested to produce sound steel gear blanks. In this procedure side risers are employed opposite

GANGWAY!

By J. A. PATTERSON

"See here, you dad-blasted wiseheimers, who's responsible for this—misspelling my name?"

each spoke with connections through a neck-down or cut-off core. These are connected in pairs, and in turn connected to the pouring sprue. A dome-shape riser is placed over the hub, and is connected to the hub through a neck-down core with three small openings.

Difficulty with Inverse Chill

Q.—We are enclosing a small sample section broken from a bathtub casting which cracked. This typifies a peculiar fracture which might be termed inverse chill, and often found associated with cracked castings. This sort of thing seems usually to occur only with the first iron tapped from the cupola.

A.—Section of the bathtub casting, 7/32-in. thick, submitted for examination is a good example of what is termed "inverse" chill, exhibiting a white center and a gray skin. That condition may be due to several causes such as the presence of antimony, lead or tellurium in the raw materials, moisture in the blast, or from moisture in the sand bottom of the cupola, in the spout lining or in the ladle lining. Zappfe recently has pointed out that hydrogen in the iron will result in inverse segregation, and its probable source is moisture.

Since you find that the difficulty occurs in the first part of the heat the logical places to look would be the condition of the sand bed or bottom of the cupola, the spout lining, and the ladle linings. We believe if you see that the spout and ladles are thoroughly dried before use, the trouble will be eliminated. Applying the torch on the spout and in the ladles for a little while will not dry them to the desired point. It is necessary to raise the temperature of the materials to around 2000° F, and hold them at the temperature for an hour or two.

Making Body for Roller Skate

Q.—We are interested in obtaining information or a book which will aid in producing a permanent mold casting. The casting is a body of a roller skate approximately 9 in. long, 2½ in. at the widest point, and 1 in. deep. As indicated in the accompanying sketch the mold is 12 in. long and 4 in. wide, made in two halves like a waffle iron. It has a sprue at one end and another at the other end to act as a relief sprue, riser and gas vent. Inside of the mold is highly polished and chromium plated. We have made a few good castings, but that must have been pure luck since the majority show pitting on the drag side. When a mold coating is used there is some pitting and the casting is very rough. We are using a 4.5 per cent Cu-5.5 per cent Si aluminum alloy melted in a forced-draft crucible furnace. We have tried temperatures from 1400 to 1600°F in the heated mold.

A.—While we are not sure, our opinion is that the pitting encountered in your casting is due to entrapped air carried down into the mold with the stream of metal. Attachment of the pouring sprue and riser to the mold as shown in your sketch is rather odd to us. Generally, they parallel the mold cavity, and if the mold was wide enough, we would suggest that arrangement. However, under the circumstances that could not be accomplished without adding a section onto the mold.

Possibly you might be able to eliminate the pitting by tilt-pouring. By that we mean placing the mold on trunnions so that the pouring sprue end could be lowered considerably, and as it fills the mold is tilted back gradually until it is level or slightly higher at the sprue. The relief sprue or riser at the opposite end would be removed, and the pouring sprue changed so that it would have only a slight taper—just enough to insure easy withdrawal from the mold. Also since the sprue will have to be changed, you might try using a flattened elliptical type, say the full width of the bottom part of the skate, and of a thickness about twice that of the skate.

Another possibility is to place the gate at one end of the mold opening directly into the cavity—pouring on end, of course. Gate could be all in what you term the drag, or part in cope and drag. Flattened type of gate should be used similar to that previously mentioned. We do not believe that the chromium plating is of much value, and are inclined to think that it may prevent the metal from lying quietly or result in cold shuts—at least that is what is claimed when mold cavities are polished. Best results are said to be obtained when the surface is slightly rough.

Molds for Copper Bars Crack

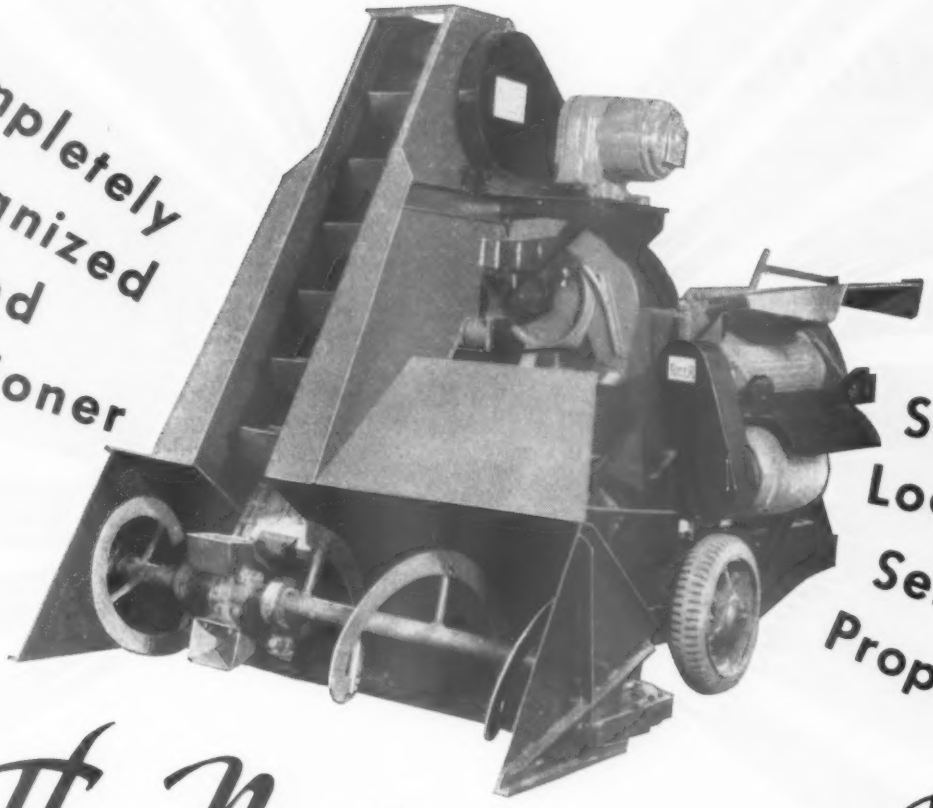
Q.—In our foundry in Italy we make molds for copper wire-bars. Cross section is as indicated in the accompanying sketch. Iron composition is 1.70 per cent Si, 0.10 per cent S, 0.42 per cent P, 0.51 per cent Mn, 3.30 per cent TC, 1.56 per cent Ni, and 0.90 per cent Cr. After pouring about 45 to 50 copper bars the molds show numerous transverse cracks about 2 to 2¼ in. apart. Good molds should produce about 200 bars before failure. Can you suggest the best composition and microstructure to obtain the maximum number of bars?

A.—So far as we know there is no simple answer to why your ingot molds crack except to point out that it is due to existence of steep thermal gradients between inside and outside of the mold. Possibly there may have been some internal stresses present before the mold was placed in service, and this aggravated the effect of expansion and contraction engendered during mold use. You do not mention whether only one mold is involved or if a number of the same composition show the same trouble. It often happens that one mold of a group made at the same time may fail on first use.

As far as mold compositions are concerned, there apparently is no best composition. In general, ingot molds—particularly those for steel—are made from low-phosphorus iron, and one example contains 1.70 per cent Si, 0.10 per cent S, 0.9 per cent Mn, 0.20 per cent P, and 3.5 per cent TC. Alloy irons also have been suggested and include the following analyses: 1.25 per cent Si, 1.25 per cent Mn, 0.20 per cent P, 1.0 per cent Mo, and 3.75 TC; 1.80 per cent Si, 1.0 per cent Mn, 0.20 per cent P, 0.60 per cent Cr, 0.7 per cent Mo, 2.75 per cent Ni, and 2.9 per cent TC.

(*Concluded on page* 100)

Completely Mechanized Sand Conditioner



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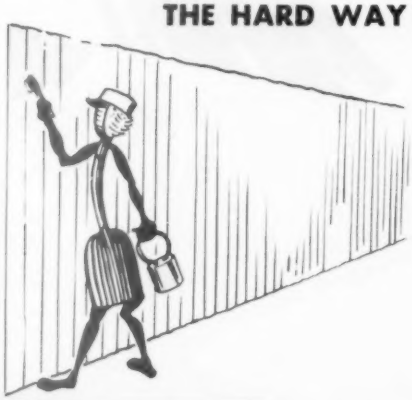
SAND CONDITIONER

Preparing your molding sand with the time consuming, back breaking, hand shoveling method is like painting a fence with a toothbrush . . . it's *the hard way*. The Royer Self-Loading, Self-Propelled Sand Conditioner does the entire job automatically. Moving into the heap under its own power, it scoops up the sand, combs, blends and aerates it, and discharges up to 50 tons per hour in any desired direction. Hard lumps and trash are culled out and a magnetic separator removes all tramp iron.

The prepared sand is light and fluffy — thoroughly blended and double aerated—ready to produce quality castings. Foundries using the Self-Loading Royer are reporting appreciable savings in production costs. Our representative will be glad to show you how the Royer can help cut costs for you.

STOP DOING IT

THE HARD WAY



ROYER

FOREMOST IN SAND CONDITIONING EQUIPMENT

ROYER FOUNDRY & MACHINE CO.

159 PRINGLE ST., KINGSTON, PA.

Questions AND ANSWERS

(*Concluded from page* 98)

It appears to us that your mold is rather heavy for the size of the copper bar produced. As nearly as we can determine a half mold weighs about 800 lb or a total weight of 1600 lb while the copper bar weighs about 200 lb. That is a weight ratio of 8 to 1. In steel ingots, which are poured at much higher temperatures than copper, the weight ratio between mold and ingot is about 1 to 1. Possibly it is the extremely heavy section which leads to the cracking since there will be a steep thermal gradient between outside and inside of the mold. Perhaps if the mold were preheated before pouring in the copper, the trouble might be decreased. Our suggestion would be to cut the mold thickness to about half of what it now is, and see what results are obtained.

Increase Sand Green Strength

Q.—We manufacture aluminum castings and use No. 00 sand in the process. We would like to know how molding sand is given green strength. Would you recommend bentonite for this? Could we use southern or western bentonite?

A.—Green strength of sand may be increased by additions of new sand, clay or bentonite. In some cases it may be increased by more thorough mixing or by increasing the moisture content where the sand is being worked on the dry side—that is to say below its best "temper." Since you primarily are interested in increasing the green strength of your sand, we believe that you will obtain the desired results by use of southern bentonite. While both types of bentonite will increase green strength, the western type also increases dry strength considerably, and that may not be desired under your particular conditions. However, it may be well to do a little experimenting before adopting one or the other. That may be accomplished by trying out separate batches for a week or two, and making close observations of the results obtained.

Bronze Bushing Has Hot Tears

Q.—We are having trouble with shrinkage cracks in large bronze bushings which mainly are poured on end, gated on top and bottom. Metal has been poured mostly on the cold side, and the castings do not show any sign of porosity. It does not seem to make any difference as to composition. Bushings range from 7 to 18 in. in diam and 8 to 18 in. long. Cracks mainly are in the middle of the bushings.

A.—While we are not sure, it appears to us that your designation "shrinkage cracks" refers to what more exactly are termed "hot tears" resulting from the inability of the alloy to stretch sufficiently during contraction. Since that characteristic of the alloy cannot be changed, the properties of the core must be adjusted so that it will yield or collapse as the alloy contracts against it.

One method of promoting collapsibility in large cores is to make only a shell of sand, filling the interior with cinders, etc. In solid cores the remedy is to reduce the hot strength by addition of cereal or wood flour. Other methods are increasing the coarseness of the sand, and eliminating or reducing the amount of bank sand or clay if either are being used. In some cases slow collapsibility may be due to use of excessive amount of binder.

Materials for Foundry Floors

Q.—We are preparing plans and specifications for an addition to our foundry, and would like to know what type of material will give the best results for the floor.

A.—No set standard for foundry floor construction materials has been established, a wide variety of types being employed. For example, one recommended procedure is to make the floor of concrete and top it with ¾ to 1 in. of a 1:2 mixture of neat cement and silica sand of about 40 to 60 mesh. A proprietary concrete floor material having a surface composed of metallic aggregate also is available. For locations where special protection against slipping is desired, a floor surface of abrasive aggregate may be applied.

Another method is to make the subfloor of concrete on which is placed a 1-in. sand cushion. Hard burned brick are set on the cushion. The brick must have sharp edges, be hard, and not subject to breaking off or spalling. Brick are laid as closely together as possible, and a thin grout is brushed on with a broom.

Wood block floors also find application in various departments. They have an accoustic value in areas where floor traffic is heavy.

Wants To Make Permanent Mold

Q.—We desire to obtain information on making permanent molds for making small aluminum castings which are hollow and weigh from ½ to 1½ lb each. About 100 matchboard patterns are involved. Is there a book on the subject?

A.—While from time to time articles have appeared in the literature on the manufacture of permanent molds, they are somewhat general since the designs employed are based upon skill and experience. We do not know of any book on the subject. Our suggestion is to have the molds made by a firm specializing in such work and guaranteeing a mold that will operate when placed in service. Another suggestion is to hire an experienced mold designer who can produce the desired results.

Molds usually are gray iron, and the rule of thumb for thickness is three times that of the casting section with a minimum of ¾ and a maximum of 2½ in.; the former to obtain rigidity, and the latter to permit handling. Cavity or impression for the casting is cast in place, but the gating and risering system is tooled out. The latter generally is made smaller than calculated for first trials, and enlarged as required. Where possible two or more cavities are made in a mold, and gated from a single sprue. Gating should follow the principle of directional solidification aided by mold coating, and heating or cooling the mold as required. Molds are made in as few pieces as possible to eliminate joints and handling.

WE CAN PROVE IT

16 years ago the Hydro-Blast Corporation was organized on a simple idea—

- **that we could serve the foundry industry by providing a sand blasting method which would not produce dust.**

Two years later, as a by-product of doing exactly what we set out to do, we had demonstrated to our own complete satisfaction

- **that our method will scrub and classify waste foundry sand, and make it in all respects equal to new sand**

We have proved both theories.

Hydro-Blast can knock out and clean many types of castings most effectively and economically, *without making dust.*

Hydro-Blast can scrub, classify and dry waste foundry sands so that *they can be used as new sand.*

As a result of those two achievements you, the foundryman

- **are free, to a great extent, of the necessity of buying cheap sand**
- **can, by the Hydro-Blast process, make castings with a better finish closer to dimensions**
- **save a great deal of money**

We assert that the Hydro-Blast process of cleaning castings and sand reclamation will eliminate many sources of dust in the foundry and vastly improve working conditions.

We expect a certain amount of disagreement as to these claims, and welcome any opportunity to prove that we know what we're talking about.

IN ITS plant the Hydro-Blast Corporation has a complete sand reclamation system of 3 tons per hour capacity. That pilot plant is available to you for a processing test of waste sand from your foundry—the test sample to be not less than 10 tons.

Hydro-Blast engineers have found that tests of samples less than 10-tons are unreliable and inconclusive; and that a processing rate of less than 3 tons per hour cannot simulate foundry operation.

The 9 tons of sand reclaimed from the 10-ton sample you submit for test will be returned to you for use in making castings in your foundry.

If you are interested in recovering up to 90 per cent of the sand you now throw away, write us.

HYDRO-BLAST

2550 NORTH WESTERN AVENUE • CHICAGO 47, ILLINOIS

FOREIGN REPRESENTATIVES { England, Norway, Sweden, Denmark and Finland—Pneulec Limited, Licensee, Smethwick (near Birmingham), England • France and Switzerland—R. Dureuil, 4 Square Du Graisivaudan, Paris 17, France • Belgium—Charles Monseur, 195 Rue Saint Leonard, Liege, Belgium • Italy—Azeta, Viale Tunisia 41, Milano

Men OF INDUSTRY

HARRY G. McMURRY, for the past year assistant foundry superintendent, Pontiac Motor Division, Pontiac, Mich., has been appointed assistant manager of the production foundry at Ford Motor Co.'s Rouge plant, Dearborn, Mich., under E. Claude Jeter, plant manager. Mr. McMurry studied mechanical engineering at Lambuth College, Jackson, Tenn., and joined Buick Motor Division in 1927 where he served various departments. From 1946 to 1949 he was engaged in setting up a modern automotive production gray iron foundry in Melbourne, Australia, for General Motors Holden's Ltd. Returning to the United States last year, he joined the Pontiac foundry staff. Active in the organization of Saginaw Valley Chapter of the AFS, Mr. McMurry served as its chairman in 1945.

♦ ♦ ♦

Changes in executive departments of the Carborundum Co., Niagara Falls, N. Y., have been announced.

Ernest R. Baxter has been named assistant vice president, **Frederick W. Bonacker,** general sales manager, and **Fred W. Scott Jr.,** sales manager of the Coated Products Division. Mr. Baxter, who joined the company in 1919, organized the company's first sales promotion department in 1926. After serving as manager of sales administrative offices in Niagara Falls, he became assistant to the vice president-general sales manager in 1943. Since last year he has been sales director. Mr. Bonacker joined Carborundum in 1911 and served in the Cincinnati, Syracuse, N. Y., Boston and New York offices. He became manager of the eastern region in 1944, at Niagara Falls, and for the past 3 years has been sales manager of the Coated Products Division. Mr. Scott, a graduate of Cornell University, joined the Detroit district office in 1938, as sales engineer for coated abrasives, was advanced to take charge of industrial sales there and since 1947 has been assistant sales manager of the Coated Products Division.

♦ ♦ ♦

A. W. Gregg, consulting engineer, Whiting Corp., Harvey, Ill., departed from New York, March 1, for a six-week business trip to Argentina and Brazil, where he will visit foundries and steel plants in the interest of his company.

♦ ♦ ♦

C. A. Sleicher has been elected president, Seaboard Foundry Inc., Providence, R. I., producers of gray iron castings. Other officers elected at the annual meeting include: **H. K. Sleicher,** vice president-secretary; **D. C. Lash,** treasurer; and **L. M. Fuller,** assistant treasurer. **E. Kent Swift,** chairman of the board of Whitin Machine Works, Whitinsville, Mass., was elected chairman of the board of directors of the Seaboard Foundry which includes all of the officers and **J. H. Bolton.**

♦ ♦ ♦

George L. Alston has resigned as vice president, secretary and treasurer, General Steel Castings Corp. Granite City, Ill., and Eddystone, Pa., and will continue as consultant. **James Macdonald,** a vice president, will assume the additional office of treasurer. Mr. Macdonald, who has also been elected a member of the board of directors, joined the company in 1939, following 8 years with Baldwin Locomotive Works, Eddystone. **Thomas J. Christian** is combining his duties as secretary with those of general accountant.

♦ ♦ ♦

P. C. Buck has been named vice president in charge of production, and **M. W. Reynolds** vice president in charge of sales, Acheson Colloids Corp., with headquarters at the home office of Port Huron, Mich. They have been with the organization 30 and 24 years, respectively. **Raymond Szymanowitz,** who joined the company 25 years ago, has been named vice president in charge of research at its laboratories in Newark, N. J.

♦ ♦ ♦

Paul T. Eaton, engineer and metallurgist, has been elected president, Southeastern Foundries Inc., Atlanta, and **Karl Aldinger** has been appointed production manager. **Harry Moffett** is superintendent of the machine shop and **Joe Moffett,** superintendent of the foundry.

♦ ♦ ♦

R. J. Thompson has retired as plant engineer, National Malleable & Steel Castings Co., Cleveland, following 22 years of service. Mr. Thompson started as a draftsman in 1928.

(*Continued on page* 104)

HARRY G. McMURRY

ERNEST R. BAXTER

FRED W. SCOTT JR.

FREDERICK W. BONACKER

Our PYNE ORE MINE

Largest underground Iron Ore Mine in the United States

This large modern ore mine is located only five miles from our furnaces. An electrically driven ore hoist at the mine pulls 22,400 pounds of ore from the bottom of the mine shaft 1300 feet in the heart of Red Mountain to the mine mouth at the rate of 1050 feet a minute.

This mine is one of three Woodward owned and operated red ore mines which have reserves estimated to be adequate for the remainder of this century. These huge ore reserves contribute importantly to making Woodward a dependable source of uniform merchant iron.

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Men OF INDUSTRY

(*Continued from page* 102)

George Mengele, who has retired as molding foreman, joined the company 53 years ago as an office boy. **William Howells** succeeds Mr. Thompson as plant engineer.

♦ ♦ ♦

Dr. Francis C. Frary, director of research, Aluminum Co. of America, was recently awarded the James Douglas Metallurgical Medal for 1950 by the American Institute of Mining and Metallurgical Engineers, at its annual banquet. The award, presented for distinguished achievement in science and contribution to the society by broadening the field of knowledge in all phases of the aluminum industry, has been awarded but four times the last ten years. Dr. Frary was graduated from the University of Minnesota, and taught there following study at the University of Berlin. He has been associated with Aluminum Co. of America since 1918, as director of research.

♦ ♦ ♦

Harold F. Merritt has been appointed executive vice president in charge of all activities of Solvay Sales Division, Allied Chemical & Dye Corp., New York. Mr. Merritt joined Wing & Evans Inc., in 1913, and has served continuously with that company and the Solvay Sales organization which succeeded it, acting as vice president of Solvay Sales for the past 19 years.

♦ ♦ ♦

William B. McFerrin has been appointed executive vice president, and **Robert M. Briney,** division vice president in charge of wrought alloy products, Haynes Stellite Division, Union Carbide & Carbon Corp., Kokomo, Ind. Mr. McFerrin was formerly assistant manager of development, Electro Metallurgical Division, Detroit, and Mr. Briney was manager of the Development Division, Union Carbide & Carbon Research Laboratories Inc., New York.

♦ ♦ ♦

Changes in the engineering department of Norton Co., Worcester, Mass., have been announced. **William C. Howard,** formerly field engineer in the Hartford, Conn., district has been named abrasive engineer with headquarters in New Haven, Conn., succeeding **J. Lawrence Tobey** who has resigned. **John W. McCue** and **F. Donald Wing** have been assigned to the Chicago office, under **Raymond E. Taylor,** and **John W. Wheeler** succeeds Mr. Howard at Hartford, Conn., office. All four men are recent graduates of the Norton sales training course.

♦ ♦ ♦

Charles J. Sauter and **I. R. Jones** have been appointed sales engineering representatives for aluminum bronze and silicon bronze vacuum die castings, Aurora Metal Co., Aurora, Ill. Mr. Sauter will cover metropolitan New York City and northern New Jersey, and Mr. Jones' territory will comprise southern New Jersey, southeastern Pennsylvania, Delaware and Maryland.

♦ ♦ ♦

At the annual meeting of the Valve Manufacturers Association, officers were named to serve for the current year. **W. B. Holton Jr.,** president, Walworth Co., New York, was re-elected president. **Ernest Cochran,** vice president, the Chapman Valve Mfg. Co., Indian Orchard, Mass., and **Charles W. Burrage,** secretary, the Lunkenheimer Co., Cincinnati, were re-elected vice presidents. **Wayne Young** president, the Ohio Injector Co., Wadsworth, O., was elected a vice president, and **George A. Cooper,** New Rochelle, N. Y., was re-elected secretary-treasurer.

♦ ♦ ♦

Harlen F. Mura, until recently associated with Northeast Equipment Co., Cleveland, has been appointed Ohio district representative for the Industrial Furnace Division, R-S Products Corp., Philadelphia.

♦ ♦ ♦

Leon A. Blum has been appointed sales manager of the San Francisco plant, Federated Metals Division, American Smelting & Refining Co., New York, succeeding **Forest A. Wahlheim,** who has retired. **Donald H. Beilstein** has been named assistant superintendent of the plant there. Mr. Blum, associated with the company for about 30 years, has served as salesman, manager of the division's Seattle branch and since 1944 has been assistant sales manager at San Francisco. Mr. Wahlheim, who has served the company for 43 years, has been sales manager at San Francisco since 1933. Mr. Beilstein, a graduate of Stanford University, joined Federated as a metallurgist in 1948.

♦ ♦ ♦

T. J. Roberts has been appointed Houston, Tex., district manager, Industrial Products Division, Johns-Manville Corp., New York, covering sales of its products in Texas, parts of Louisiana, Arkansas and Oklahoma. **Henry G. Palmer,** formerly assistant manager of the Atlanta district, succeeds Mr. Roberts as district manager there. Mr. Roberts, a graduate of Cornell University, has been with Johns-Manville since 1925.

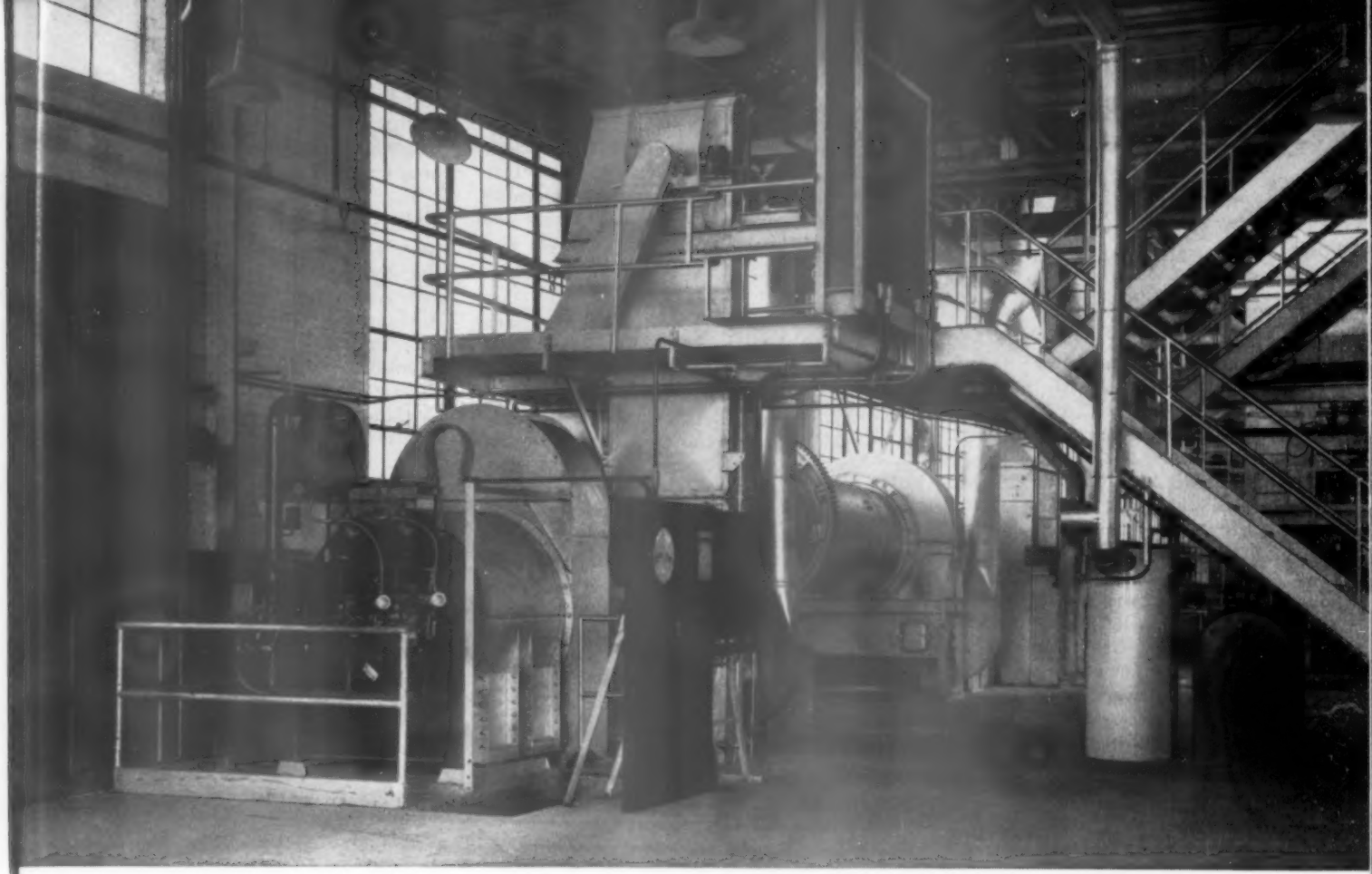
(*Continued on page* 106)

DR. FRANCIS C. FRARY

HAROLD F. MERRITT

ROBERT M. BRINEY

WILLIAM B. McFERRIN



Apron Conveyors Are Unsurpassed for Handling Hot Sand and Castings from the Shakeout—Also Cut Time and Cost of Conveying Castings Through Cleaning Departments. Types, Sizes and Pitches for any Layout.

Compact System for Malleable Annealing, Showing Shakeout, Dust-Sucker Hood, Sorting Table Conveyor, Material Handling and Cleaning Equipment, Storage Bins, and Lowerator That Permits Each Pot in the Stack to be Packed at a Convenient Height.

Sand Control

cuts core costs

● Drying your own core sand results in better deliveries and lower sand costs. It permits exact duplication of every mix — saves on binders — results in a uniform bake — constant core structure and reduces losses of both cores and castings.

Dryers or combination dryer-coolers — gas, oil or steam heated — floor or overhead mounting — complete with storage, feeding and all conveying facilities — large or small capacities to meet your requirement. The C. O. Bartlett & Snow Company, 6201 Harvard Avenue, Cleveland 5, Ohio.

DESIGNERS ENGINEERS

BARTLETT-SNOW
CLEVELAND 5, OHIO

FABRICATORS ERECTORS

Men OF INDUSTRY

(*Continued from page* 104)

Mr. Palmer, who was graduated from University of Georgia, joined the company in 1936.

♦ ♦ ♦

John R. Wark, for the past 12 years associated with the Queen City Sand & Supply Co., Buffalo, has resigned and has organized Wark Foundry Services Inc., 97 Woodcrest Blvd., Kenmore, N. Y. The new company will handle a line of foundry supplies and equipment. Prior to joining Queen City Sand & Supply Co. in 1938, he was associated for 15 years with E. J. Woodison Co., Detroit, serving as its Buffalo branch manager for two years. During the recent war Mr. Wark served with the Navy, being discharged with rank of lieutenant, junior grade. He is chairman of the Western New York Chapter of the American Foundrymen's Society, outgrowth of the former Buffalo Chapter of the AFS which he helped organize.

♦ ♦ ♦

J. F. B. Jackson has been appointed director of research of the recently formed Research and Development Division, British Steel Founders' Association. Mr. Jackson has been associated with David Brown & Sons Ltd., Huddersfield, England, since 1933, serving as research metallurgist, foreman of the nonferrous foundries, and technical superintendent of the steel, iron and bronze foundries at Penistone. In 1943 he was made chief metallurgist and technical controller in the head office at Huddersfield. In 1946 he was appointed a director of David Brown-Jackson Ltd., engineers and steel founders of Manchester. Mr. Jackson has contributed extensively to American and British publications. In 1945 he was a member of a four-man team, sponsored by the Ministry of Aircraft Production, which visited German steel foundries, and last year he toured steel foundries in Canada and the United States.

♦ ♦ ♦

William F. MacDonald has been elected president, E. F. Houghton & Co., Philadelphia, manufacturers of industrial oils, leathers and chemicals. Mr. MacDonald, who will temporarily continue to hold his present office as treasurer, succeeds **Maj. Aaron E. Carpenter,** who has become chairman of the board of directors. A graduate of University of Pennsylvania, Mr. MacDonald joined Houghton in 1927, where he has served as cost clerk, industrial engineer, credit manager and treasurer, and since 1946 as assistant to the president. **Dr. James T. Eaton,** manager of research, who has been associated with the company since 1937, was elected a director. Other directors re-elected are: **G. W. Pressell,** vice president; **Dr. R. H. Patch,** vice president-operations; **D. J. Richards,** vice president-sales; **E. A. Carpenter,** secretary; **C. H. Butler; H. B. Fox,** and **L. D. Holland.**

♦ ♦ ♦

Malcolm W. Valentine has been named superintendent of inspection and quality control for Hunt-Spiller Mfg. Corp., Boston. He started with the company in 1915 as a patternmaker.

♦ ♦ ♦

T. H. Caldwell Jr., formerly manager of die casting sales for the magnesium division, Dow Chemical Co., Midland, Mich., has been transferred to the chemical sales staff at the new Atlanta office opened Jan. 16. Mr. Caldwell, a graduate of Michigan State College and of the Dow training course, joined the company in 1940. Prior to his recent appointment he was engaged in magnesium production control and sales.

♦ ♦ ♦

Maurice W. Hollands, who for the past year has been associated with the Philadelphia plant of General Smelting Co., has been appointed manager of its Canadian plant, General Smelting Co. of Canada Ltd., Hamilton, Ont., an affiliate of the Steel Co. of Canada. Mr. Hollands, a graduate of University of Toronto, joined Fittings Ltd., Oshawa, Ont., as plant metallurgist, in 1937. Three years later he was called to service and until 1943 was an inspector of ordnance and ferrous materials for the Canadian government. In 1943 he became foundry metallurgist, Walker Metal Products Ltd., Walkerville, Ont.; in 1945 he was associated with William Kennedy & Sons Ltd., Owen Sound, Ont., as plant metallurgist, and in 1947 returned to Fittings Ltd. as superintendent of foundries.

♦ ♦ ♦

James R. Hewitt Jr. has been appointed district representative in Texas and Louisiana for the Ayers Mineral Co., Zanesville, O., distributor of Ohio and Tennessee molding sands. **Walter Zeis,** manufacturers' representative, will cover the St. Louis and Kansas City, Mo., territory for the company. Mr. Hewitt has represented Foundry Equipment Co., Cleveland, and National Engineering Co., Chicago, in the Texas-Louisiana territory for over a year. Mr. Zeis has operated his own foundry supply company since 1937.

♦ ♦ ♦

Milton F. Beecher has been elected vice president in charge of research and development, Norton Co., Worcester, Mass. **George N. Jeppson** has

(*Concluded on page* 108)

JOHN R. WARK

J. F. B. JACKSON

MAJ. A. E. CARPENTER

WILLIAM F. MacDONALD

Prescription for Core Troubles

℞ Use Krause cereal binders and get these 4 big helps in making finer cores and castings
1 GET MORE GREEN STRENGTH
2 IMPROVE FLOWABILITY AND TEXTURE
3 PRODUCE FINER DETAIL
4 GET EASY BURN-OUT COLLAPSIBILITY

For better, lower cost cores place a trial order for Krause Cereal Binders now — TRUSCOR if you like light weight; AMERIKOR if you prefer a heavier weight. Order through any of the distributors below or direct.

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World's Largest Millers of Dry Corn

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A. L. Cavedo & Son, Inc.
Richmond 21, Va.

Foundry Supplies Co.
Chicago 16, Ill.

J. H. Hatten
Lansdowne, Pa.

J. B. Hayes Co.
205 So. 32nd Street
Birmingham 5, Ala.

Independent Foundry Supply Co., Los Angeles 11, Calif.

Marthens & Co.
Moline, Illinois

Carl F. Miller & Co.
Seattle 4, Wash.

Milwaukee Chaplet & Mfg. Co., Milwaukee 15, Wis.

Porter-Warner
Chattanooga 2, Tenn.

Smith-Sharpe Co.
Minneapolis 14, Minn.

Snow & Galgiani
533-543 Second Street
San Francisco 7, California

Frederic B. Stevens, Inc.
Buffalo 12, N. Y.

Frederic B. Stevens, Inc.
Cleveland 14, Ohio

Frederic B. Stevens, Inc.
Detroit 26, Mich.

Frederic B. Stevens, Inc.
166 Brewery Street
New Haven 11, Connecticut

Western Industrial Supply Co.
208 S.E. Hawthorne Blvd.
Portland 14, Oregon

Men OF INDUSTRY

(*Concluded from page* 106)

been re-elected chairman of the board of directors and **Milton P. Higgins,** company president. Mr. Beecher, a graduate of Iowa State College, joined the company's ceramic section in 1915, became its chief the following year, research engineer in 1919, and has been director of research since 1941. He is a member of the executive committees of the Institute of Ceramic Engineers and the American Ceramic Society.

♦ ♦ ♦

Stephen Pasick has been appointed manager of the Detroit district office, Sterling Wheelbarrow Co., Mil-

STEPHEN PASICK

waukee, to handle sales of the company's flasks and miscellaneous foundry equipment. For the last three years he was plant superintendent, Albion Malleable Iron Co., Albion, Mich., and prior to that for 15 years served in various supervisory capacities with the company. Mr. Pasick is well known among Michigan foundrymen and has been a member of the American Foundrymen's Society for the last ten years.

♦ ♦ ♦

William F. U'Ren, until recently associated with the sales staff, Columbia Steel Co., San Francisco, has been appointed sales engineer, Columbia Steel Casting Co., Portland, Oreg.

♦ ♦ ♦

Melvin O. Monsler has been named sales manager of the P&H Welding Division, Harnischfeger Corp., Milwaukee. Mr. Monsler, who has been associated with the division for 12 years, has served for 4 years as assistant sales manager and one year as welding product service engineer. Prior to joining P&H he was an instructor in welding and shop procedure, Milwaukee School of Engineering.

♦ ♦ ♦

Carl Harmon Jr. has joined the sales department, Champion Refractories & Distributing Corp., Buffalo. Mr. Harmon is the son of Carl Harmon, metallurgist, Hanna Furnace Corp., also of Buffalo.

♦ ♦ ♦

E. Eugene Lenrow has been appointed sales representative in New York state for Metals Disintegrating Co. Inc., Elizabeth, N. J. Mr. Lenrow will cover the sale of metal pigments, aluminum paste and powder, etc., in all excepting Niagara, Erie and Chautauqua counties, and the entire state on the sale of metal abrasives, special heat treated shot and diamond grit for the Harrison Abrasive Division of the organization.

♦ ♦ ♦

Kurt A. Miericke has been appointed sales manager of the bentonite department, Baroid Sales Division, National Lead Co., New York, with headquarters at 637 Railway Exchange Bldg., Chicago.

♦ ♦ ♦

Lorin G. Miller, dean of the College of Engineering, Michigan State College, has been appointed engineering consultant United States Radiator Corp., Detroit. Dr. Miller is active in the program of the Institute of Boiler and Radiator Manufacturers. In his new position he will actively participate in engineering research development of United States Radiator Corp. products, including boilers and radiators.

♦ ♦ ♦

Wallace F. Schott has been appointed representative in eastern Ohio and western Pennsylvania for Holcroft & Co., Detroit, designers and builders of production heat treat furnaces. Mr. Schott, who has been engaged in the industrial heating field for 20 years, will cover the territory from his headquarters at Wallace F. Schott Co., 6516 Detroit Ave., Cleveland 2.

♦ ♦ ♦

Ralph A. Clark, formerly in the Chicago office of the Electro Metallurgical Division, Union Carbide & Carbon Corp., New York, has been appointed assistant manager of development in the Detroit territory succeeding **William B. McFerrin,** who recently became executive vice president of the company's Haynes Stellite Division, Kokomo, Ind. Mr. Clark spent 14 years in foundry production work prior to joining Electromet as a development engineer.

♦ ♦ ♦

A. W. Simpson has been appointed president-treasurer, Western Die Casting Co., San Francisco, and **F. K. Hartenstein** has been named vice president-secretary. All directors of the company have been re-elected.

♦ ♦ ♦

Donald L. Clark, in charge of melting at Simond Saw & Steel Co., Lockport, N. Y., has been named to complete the unfinished term of vice president, Electric Metal Makers Guild Inc., made vacant by the resignation of **E. J. Chelius.**

♦ ♦ ♦

John W. Goodwyn has been appointed sales representative, United States Graphite Co., Saginaw, Mich.,

JOHN W. GOODWYN

with headquarters in Chattanooga, Tenn. Mr. Goodwyn, a graduate of Tulane University, will cover, in addition to Chattanooga and parts of Tennessee and North Carolina, all of Alabama, South Carolina, Georgia and Florida.

♦ ♦ ♦

Edwin J. Daehn, superintendent, Pelton Steel Casting Co., Milwaukee, recently was presented a gold-plated molder's tool following 50 years in the foundry industry. Mr. Daehn joined B. Hoffman Co. there at the age of 15, and became superintendent under his father's supervision. In 1917 he was appointed superintendent at a plant of the old Stowell Co., which later was acquired by the Pelton company to be operated as a separate company.

♦ ♦ ♦

R. P. Sperling has been appointed purchasing agent, G. W. Davis Corp., which operates a foundry and factory in Richmond, Ind.

NEED INCREASED PRODUCTION PER MAN-HOUR?

Rely on-

EXPERIENCED PROFESSIONAL ENGINEERING HELP!

THERE IS one reliable, *proved* way to solve your problems to secure greater unit production, reduce costs and insure a profit. These problems usually cannot be solved satisfactorily by "sparetime" study, nor can they be entirely solved by installing new equipment. The most economical way is to use the services of an experienced organization of specialists—men with 10 to 25 years of successful experience in foundry management, production, engineering or equipment—to develop and carry out a program designed to meet your particular problems and resources.

Knight Engineers are professional foundry specialists whose only interest is to help you solve your problems to best advantage at lowest cost. Knight Engineers have no interest in the sale or use of any type of equipment.

Call or write the Knight Chicago or New York Office for immediate attention.

KNIGHT Services For Foundries:

- *Foundry Engineering*
- *Architectural Planning*
- *Foundry Layout*
- *Foundry Modernization*
- *Foundry Management*
- *Industrial Engineering; Job Evaluation, Incentives*
- *Production and Cost Control*

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CONSULTING SERVICE
for Management • Sales • Production

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INDUSTRY Briefs

H. K. FERGUSON CO., Walnut & Eleventh St., Cleveland, industrial engineer and builder, has acquired O. D. Conover Engineering Co., Cleveland, foundry design and construction specialist. The Conover staff will form the nucleus of a newly established foundry division within the H. K. Ferguson Co. Oliver D. Conover, foundry engineer, who has headed his firm since its founding in 1932, will direct the new division. Prior to forming his own company Mr. Conover was vice president of the Foundry Equipment Co., and for ten years was assistant chief engineer and foundry specialist for the Austin Co., both of Cleveland.

* * *

Bedford Tool & Forge Co., 22 Interstate St., Bedford, O., manufacturer of hand and pneumatic chisels, has appointed the following representatives: H. J. Bannister, 124 Wilford Bldg., 33rd & Arch Sts., Philadelphia; George Rellim, Acme Tool Mfg. Co., 258 Washington Ave., Belleville, N. J., and A. C. Schwartz, 3240 Bradford Rd., Cleveland Heights 18, O.

* * *

American Brake Shoe Co., New York, has consolidated all operations of its Canadian subsidiaries into one corporation, the Dominion Brake Shoe Co., 1405 Peel St., Montreal. The five Canadian divisions to be operated by Dominion Brake Shoe are the Brake Shoe Division, Joliette Steel Division, Canadian Ramapo Division, American Brakeblok Division and Kellogg Division. It also will continue to operate plants at Lindsay, Niagara Falls and St. Thomas, in Ontario, and at Joliette, Quebec.

* * *

American Machine & Metals Inc., 233 Broadway, New York, has acquired the Gotham Instrument Co., New York, manufacturer of industrial recording and controlling instruments. These will supplement the line of pressure, temperature, electrical, flow, and liquid level indicating instruments made by United States Gauge Division, American Machine & Metals Inc., Sellersville, Pa.

* * *

Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., has appointed three manufacturer's agents. Miller-Joyce, 122½ South Vermont Ave., Los Angeles, and Whitty Engineering Co., Ten High St., Boston, will handle hydraulic presses and related equipment. J. R. Allen Co., 402 Swetland Bldg., Cleveland, will handle rough machined steel castings.

* * *

Ideal Industries Inc., 1011 Park Ave., Sycamore, Ill., has purchased the business and assets of Tincher Products Co., Chicago, manufacturer of a process for sealing porosity in castings. The Tincher company will operate under its old name as a wholly-owned subsidiary of Ideal. Expansion plans call for setting up sales, engineering and service representation in at least seven foundry areas.

* * *

Round Chain & Mfg. Co. has been formed in Chicago with offices and warehouses at 646 West Lake St. John F. Ansink is general manager of the firm which will be directly affiliated with the five other Round Chain plants. These plants produce industrial, marine, railway, automotive, building, home and farm chain of every type.

* * *

U. S. Reduction Co., 4610 Melville Ave., East Chicago, Ind., is producing and shipping finished ingot from a newly acquired plant in Toledo, O. U. S. Reduction also announces the appointment of J. B. Neiman Co., 729 Fisher Bldg., Detroit, as Michigan sales engineering representative.

* * *

Allmetals Foundry Inc., Kings, N. Y., has been incorporated as a foundry and machine shop business. Directors are D. George Levine, Roslyn Brust, and Sydell Wolpert, 51 Chambers St., New York.

* * *

Laclede-Christy Co., Ambassador Bldg., St. Louis 1, manufacturer of refractories and allied lines, has contracted to purchase the assets and liabilities of Chicago Retort & Fire Brick Co., Ottawa, Ill., in exchange for common stock.

* * *

Syntron Co., Homer City, Pa., manufacturer of vibratory material handling equipment, portable power tool equipment and allied items, has moved its New York sales and engineering office to 1860 Broadway, New York 23.

* * *

Alvin B. Vittert and Milton Keiner of St. Louis have acquired controlling interest in Marion Machine, Foundry & Supply Co., Fourth St. & Big 4 Railroad, St. Louis, from the estate of Charles C. Chamberlain, its founder.

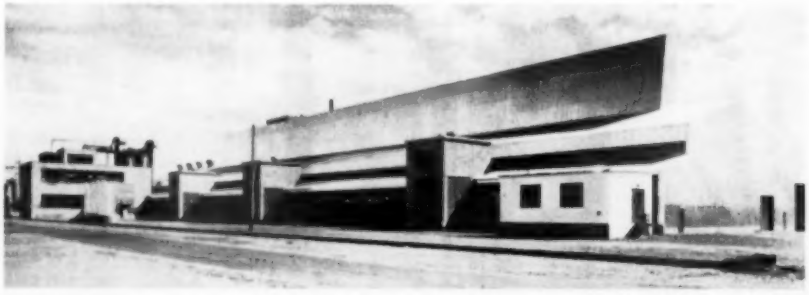
* * *

Aluminum Foundries Inc., North Main St., Winchester, Ind., recently completed new offices and a 30 x 105-ft addition to the foundry building. Aluminum die casting, bronze casting and magnesium casting departments have been added to the foundry.

* * *

California Soil Pipe & Fitting Foundry has opened a plant in the plant of the old Taft Alloy Steel Co.,

(*Concluded on page* 112)



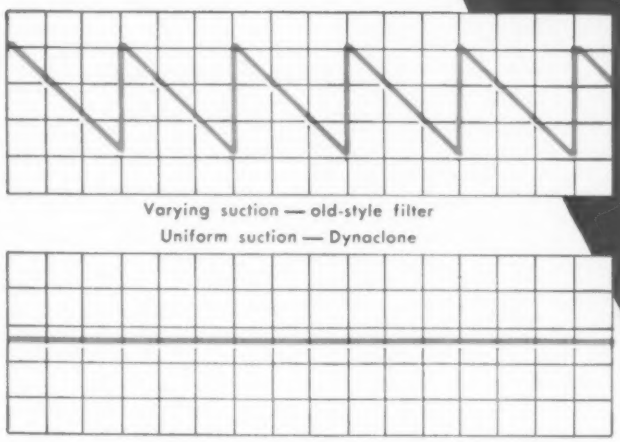
NEW PLANT: Carborundum Co., Niagara Falls, N. Y., has started production of silicon carbide at its new $2 million plant in Vancouver, Wash. The plant is located on a 99-acre site adjacent to the Port of Vancouver Terminal, Number Two. J. L. Bergman is plant superintendent; A. C. Knapp, plant engineer, and E. E. Einhorn, office manager

NEW! NEW!

NEW Cloth Screen Dust Filter

SLY DYNACLONE*

offers 5 NEW ADVANTAGES!



1. Eliminates mechanical shaking.
2. Provides uniform suction at dust source.
3. Assures longer bag life . . . 4. minimum maintenance.
5. Keeps itself automatically and continuously clean without additional power or equipment.

Send for descriptive bulletin just out on the new Sly Dynaclone — the ultimate in filter performance.

This revolutionary new dust filter is another Sly first. Extremely simple and thoroughly dependable, it eliminates entirely the gremlin of mechanical shaking and provides uniform suction of air at dust source.

This uniform suction is achieved by a simple device which cleans the filter bags successively by a reverse flow of air—the same suction which draws the dust onto the filter cloth is reversed to blow it off.

Since this reverse air suction operates continually, the new Sly Filter requires no shutdowns for removing dust from the cloth.

No mechanical shaking or flexing device is needed, eliminating all strain and wear on the filter bags.

The simplicity of design and operation and elimination of all auxiliary equipment for periodic cleaning of bags mean a saving of floor space and a very minimum of maintenance.

The result of long experimentation and exhaustive tests, the Sly Dynaclone has thoroughly proved itself. It provides substantial savings over any other type of cloth screen dust collection. Write for complete information.

*Patent Applied for

SLY PIONEERS and LEADERS in INDUSTRIAL DUST CONTROL

THE W. W. SLY MANUFACTURING CO.
4753 Train Avenue • Cleveland 2, Ohio
NEW YORK • CHICAGO • ST. LOUIS • PHILADELPHIA
DETROIT • MINNEAPOLIS • BIRMINGHAM • CINCINNATI
LOS ANGELES • ROCHESTER • TORONTO

(*Concluded from page* 110)

201 East Main St., Taft, Calif. Eugene Pendley is president of the new firm. John I. Fitzpatrick is vice president, and Orville Pendley is secretary-treasurer.

* * *

Ventilator Division of the Swartwout Co., Cleveland, now shares the company's New York branch office at 103 Park Ave. with the company's steam specialties division. Frederick Rickmeyer is in charge, succeeding the late Percy Jones.

* * *

F. E. Schundler & Co., 504 Railroad St., Joliet, Ill., have resumed shipment of bentonite from new virgin deposits in eastern Wyoming. New plant facilities have been provided to furnish the product.

* * *

American Steel Foundries plant in East St. Louis, Ill., closed since August, was scheduled to resume operations Apr. 1 on a one-furnace basis.

* * *

Robbins & Bohr, 535 Chattanooga Bank Bldg., Chattanooga 2, have been made Tennessee representatives of the Ironton Fire Brick Co., Ironton, O.

* * *

Baton Rouge Iron Works Inc., Baton Rouge, La., has been incorporated as an iron foundry and machine shop.

* * *

Automatic Transportation Co., Chicago, manufacturer of electric industrial trucks, has named as sales representative, P. W. Voss & Associates, 918 South Michigan Ave., Chicago, successor to Lindsley and Voss.

* * *

Aurora Metal Co., 614 West Park Ave., Aurora, Ill., has appointed Mayer & Roth, 2007 Madison Rd., Cincinnati 8, sales engineering representative for aluminum bronze and silicon bronze vacuum die castings.

* * *

Whiting Corp., Harvey, Ill., has moved its Philadelphia district sales office from Broad St. Station Building to Nine Rittenhouse Place, Ardmore, Pa. G. M. Dennis continues as district manager.

* * *

Vonnegut Moulder Corp., 1819 Madison Ave., Indianapolis 25, has purchased the patents, sales and manufacturing rights for a swing belt grinder from Newton Mfg. Co., Temple, Tex.

* * *

Eriez Mfg. Co., Erie, Pa., producer of magnetic equipment, has appointed O'Brien Industrial Equipment Co., 1295 Folsom St., San Francisco, sales representative.

* * *

National Sewing Machine Co., State & Meadow Sts., Belvidere, Ill., suffered severe loss when fire swept through its million-dollar foundry Feb. 20.

* * *

Swayne, Robinson & Co., Third & Main Sts., Cambridge City, Ind., lost its foundry in a fire Feb. 5.

Wise Owl Club Members Save Eyes

People who saved their sight by wearing safety glasses in the performance of their work are eligible for membership in the Wise Owl Club of America. Organized on a national basis 16 months ago by the Industrial Advisory Committee of the National Society for the Prevention of Blindness, the club now has a membership of 783 men and four women.

The club was started in 1947 at the St. Louis plant of American Car & Foundry Co. The following year the company proposed that the society sponsor the club as a national movement. Since then the membership has jumped from 76 to 787. Any company can set up a Wise Owl chapter by applying to the society at 1790 Broadway, New York 19.

Book Review

The Fatigue Allowance in Industrial Time Study, written and published by Matthew A. Payne, 13777 Euclid Ave., East Cleveland 12, O., paper, 66 pages, 6 x 9 in. Price $2.50.

The author presents and discusses problems associated with the purpose, determination and application of the fatigue allowance in industrial time study. The book contains many industrial engineering opinions concerning the fatigue allowance and its effect upon workloads, fair day's work, man power, and incentive assignments.

Meetings of Interest to Foundrymen

Apr. 4-8—Chicago Technical Societies Council, national production exposition, Stevens Hotel, Chicago

Apr. 10-12—American Institute of Mining and Metallurgical Engineers, Iron and Steel Division, 33rd annual conference, Netherland Plaza Hotel, Cincinnati.

Apr. 28—Malleable Founders' Socety, western sectional meeting, Drake Hotel, Chicago.

May 8-12—American Foundrymen's Society, annual convention and exhibition, Public Auditorium, Cleveland

May 19—Malleable Founders' Society, eastern sectional meeting, Commodore Hotel, New York

May 26—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

June 1-3—Electric Metal Makers Guild, annual meeting, Shawnee Hotel, Springfield, O.

June 22-23—Malleable Founders' Society, annual meeting, The Homestead, Hot Springs, Va.

June 26-30—American Society for Testing Materials, annual meeting and exhibition, Haddon Hall, Atlantic City, N. J.

July 28—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

Sept. 25-26—Steel Founders' Society of America, fall meeting, The Homestead, Hot Springs, Va.

Sept. 28-29—All Canadian Foundry Conference, Hamilton, Ont.

Oct. 12-14—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

Oct. 13-14—Gray Iron Founders' Society, annual meeting, Netherland Plaza Hotel, Cincinnati

Oct. 23-27—National Metal Congress and Exposition sponsored by American Society for Metals, American Welding Society, Metals Branch—American Institute of Mining and Metallurgical Engineers, and Society for Non-Destructive Testing, International Amphitheatre, Chicago.

Nov. 9-10 — National Foundry Association, annual meeting, Edgewater Beach Hotel, Chicago

Nov. 9-11—Steel Founders' Society of America, annual technical and operating conference, Carter Hotel Cleveland

Smaller Foundries, too

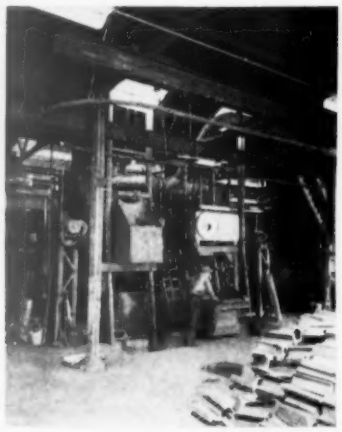
ARE BENEFITING FROM WHITING-ENGINEERED MECHANICAL CHARGING

TODAY, mechanical charging is reducing costs and improving working conditions in scores of smaller foundries —plants which pour no more than 5 to 25 tons per day. No need to envy the "big fellows" . . . Whiting engineers will gladly show how YOU can use mechanization economically and profitably.

Whiting Charging Installations begin with simple skip hoists, bucket loaders, and other inexpensive equipment that small foundries can use to advantage. No operation is too small to receive our careful attention. Why not ask for our suggestions?

These two Whiting #4 Cupolas are served by side-dump skip hoist chargers

Bottom-dump scale-lorry suspended from monorail . . . shown in material yard



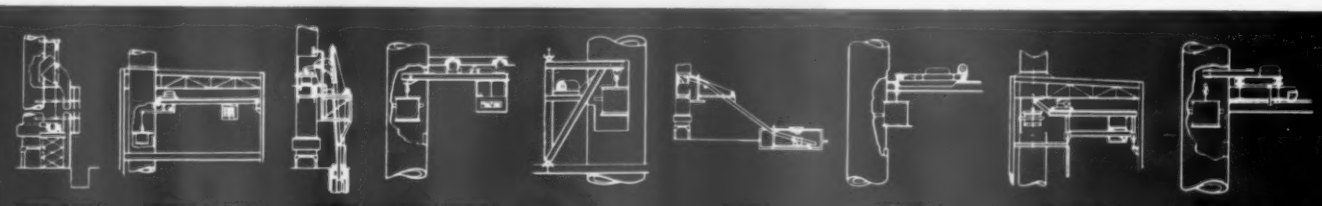
Here the monorail lorry discharges into the skip hoist charging bucket

WHITING CORPORATION

15607 Lathrop Ave., Harvey, Illinois

Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, and St. Louis. Agents in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario. Export Department: 30 Church St., New York 7, N. Y.

WHITING MAKES ALL TYPES OF MECHANICAL CHARGERS



SIDE-DUMP SKIP | UNDERSLUNG CRANE | "VM" SKIP | MONORAIL CRANE | JIB CRANE | SWIVEL SKIP | HORSESHOE TROLLEY | GANTRY CRANE | OVERHUNG CRANE

BUFFALO PATTERN WORKS — Since 1893

The rest of this large equipment includes: 1 Aluminum Cope Plate; 24 Aluminum, steel-faced Core Boxes with 53 loose pieces; 6 sets of Aluminum Ram-up Core Driers in 108 pieces; 9 Aluminum, steel-faced Core Rubbing Fixtures; 1 Aluminum Core Assembly & Pasting Gauge; 1 Aluminum Core Setting Gauge; 1 complete set of Cast Iron Chills.

There were over 4 Tons of Aluminum used in this Equipment.

OUR ESTIMATING DEPARTMENT WELCOMES YOUR INQUIRIES . . .

BUFFALO PATTERN WORKS

• DESIGNERS AND MANUFACTURERS OF PATTERN EQUIPMENT FOR OVER HALF A CENTURY

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OBITUARY

WILLIAM WATTS ROSE, 66, for ten years executive vice president, Gray Iron Founders' Society, died Feb. 20, at Marine Hospital, Baltimore. Mr. Rose, who was graduated from West Point in 1906, resigned from the Army in 1919 and for about seven years was Brazilian vice president for Bethlehem Steel Co. Later he was located in the Mediterranean region as regional manager for Delco Light Co., and Frigidaire Corp., subsidiaries of General Motors Corp. Following a period in consulting work, in 1931 Mr. Rose became assistant to the president, American Sealcone Corp., New York, and in 1934 went to Washington to take an administrative position with the NRA. He joined the Gray Iron

WILLIAM W. ROSE

Founders' Society in 1936 and took an active part in furthering the interests of the industry. Months before war was declared, he recognized the importance of having the gray iron industry represented in Washington, and opened an office there in 1941. Throughout the war years he gave much in time and effort to the problem of helping gray iron foundries render maximum service to the nation at war. He retired from the society late in 1945, due to ill health, but continued to reside in Washington.

* * *

Dr. H. W. Gillett, 66, former director, Battelle Institute, Columbus, O., died Mar. 3, from a heart attack near Nicholasville, Ky., while returning from a hunting trip in Florida and Georgia. Dr. Gillett, who was born in Steuben County, N. Y., received a doctor's degree in chemistry and electrothermics from Cornell University. He became associated with U. S. Bureau of Mines in 1912, later becoming chief alloy chemist in charge of the field station in Ithaca, N. Y. In 1924 he was appointed chief of the Division of Metallurgy, U. S. Bureau of Standards. Recognized as one of the country's outstanding metallurgists, in 1929 Dr. Gillett was appointed director of Battelle Institute, and from 1934 until 1949 acted as chief technical adviser. He was serving as technical consultant at the time of his death. In 1932 Dr. Gillett received the John A. Penton Gold Medal of the American Foundrymen's Society, and in 1944 he delivered the Charles Edgar Hoyt Lecture of the AFS.

* * *

Richard Armstrong, chief metallurgist, Pittsburgh Steel Foundry Corp., Glassport, Pa., died Feb. 17 at Pittsburgh. Before joining the Pittsburgh organization, Mr. Armstrong had been associated with Algoma Steel Corp. Ltd., Sault Ste. Marie, Ont., and Canadian Steel Foundries Ltd., Montreal, Que., which has since been absorbed by the Canadian Car & Foundry Co., Montreal.

* * *

C. Rodney Neff, vice president-treasurer, Neff & Fry Co., Camden, O., died Feb. 8, in Opelousas, La., following a motor accident in New Iberia, La. Mr. Neff relinquished the office of president of the company a few years ago, following the death of his father Charles R. Neff, co-founder with M. B. Fry in the super-concrete stave silo business.

* * *

Henry R. Robinson, 75, a former president of Swayne, Robinson & Co., Richmond, Ind., died Jan. 24, following a long illness. Mr. Robinson, a grandson of one of the company's founders, entered the business as an apprentice, advancing through various executive positions until he reached the presidency in 1933.

* * *

Harry Sobel, 46, president-general manager, Orange Foundry Inc., Orange, Mass., died Feb. 1, in Boston. Mr. Sobel had been production manager, Independent Lock Co., Fitchburg, Mass, until about 5 years ago when he went to Orange.

* * *

Alfred D. Edwards, 82, chairman of the board of directors, Woodruff & Edwards Inc., Elgin, Ill., died recently. Mr. Edwards organized the foundry company 47 years ago.

* * *

Fred J. Buckley, 82, president, Kalamazoo Foundry & Machine Co., Kalamazoo, Mich., died there Feb. 16. Mr. Buckley attended Kalamazoo College and was graduated from Rose Polytechnic Institute in 1891. For the next year he was engaged in experimental work at Westinghouse Electric Co., Pittsburgh and following the death of his father he joined Buckley Electric & Mfg. Co., which later became Kalamazoo Foundry & Machine Co.

* * *

Alfred M. Fulton, president, Northern Malleable Iron Co., St. Paul, who died Feb. 15, as reported in THE FOUNDRY for March, was born in Chester County, Pa., and was associated with Baldwin Locomotive Works, Philadelphia, and Fort Pitt Malleable Co., Pittsburgh, prior to joining Northern Malleable Iron Co., in 1920. He has taken an active part in work of various national technical committees of the American Foundry-

ALFRED M. FULTON

men's Society, notably the malleable handbook on recommended practices and program-papers groups, and was chairman of the Malleable Divison in 1947. Mr. Fulton was serving as a national director of the AFS and was a former chairman of the Twin City Chapter.

* * *

Frank A. Hughes, 49, manager of the sales engineering department, Bay State Abrasive Products Co., Westboro, Mass., died Feb. 12. Mr. Hughes was graduated from Worcester Polytechnic Institute following service in World War I. He was a member of the American Society of Tool Engineers.

* * *

Charles A. Brown, 66, former vice president and general manager, Lunkenheimer Co., Cincinnati, died recently. He retired from active service in 1945.

* * *

Frederick Renaud, 74, former owner of D. J. Renaud & Son Foundry, Carthage, N. Y., died Feb. 22.

Cycle of INTERNATIONAL TYPE AN MACHINE

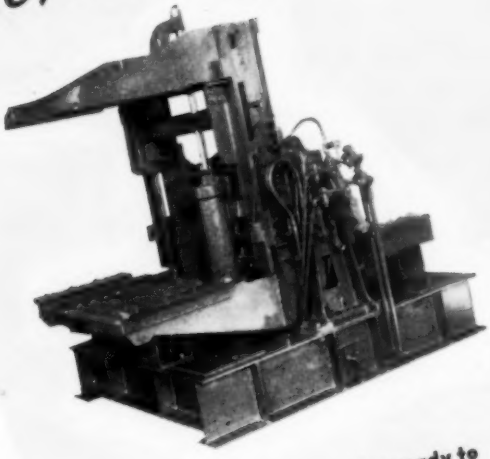


FIGURE 1 shows the machine ready to receive the core box or mold after it has been rammed.

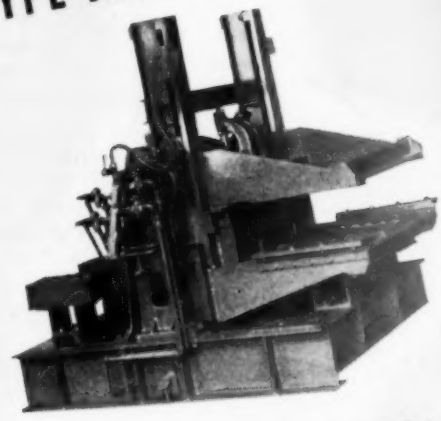


FIGURE 2 shows that the clamp valve has been operated to bring the upper frame down to clamp the core plate to the box or bottom board to flask. The movement of this frame is automatically limited according to the depth of the box or overall of pattern plate flask and bottom board.

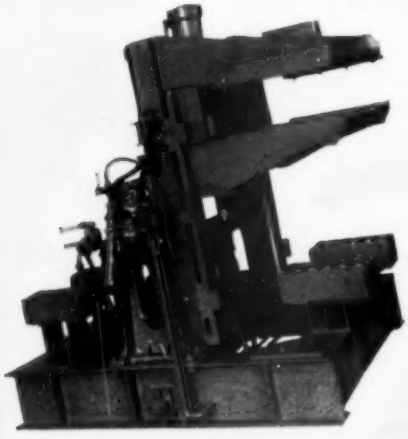


FIGURE 3 shows that the turnover valves of the machine have been operated so that the entire center unit which supports the turnover frame of the machine—carrying the clamped box or complete half mold—is turned over.

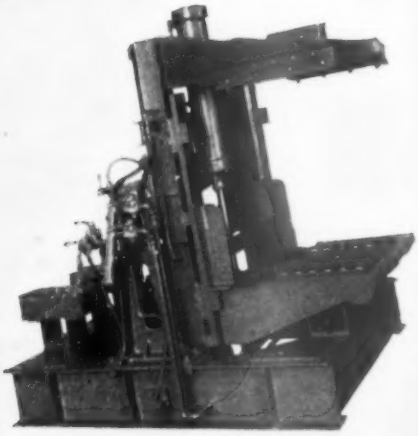
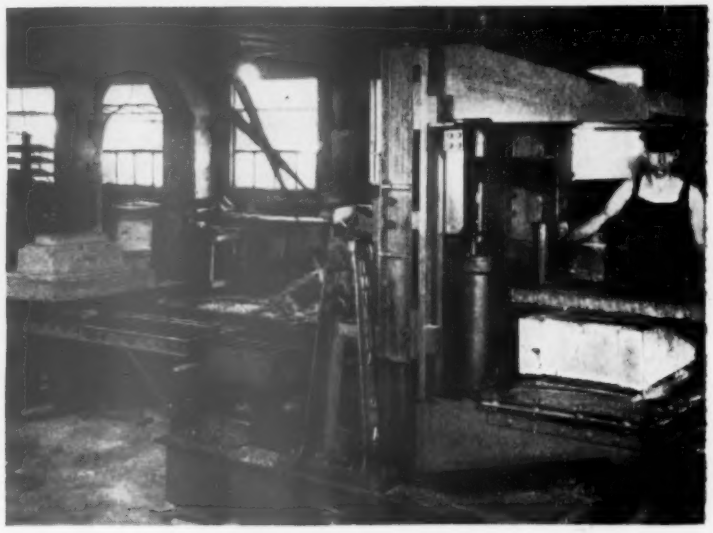


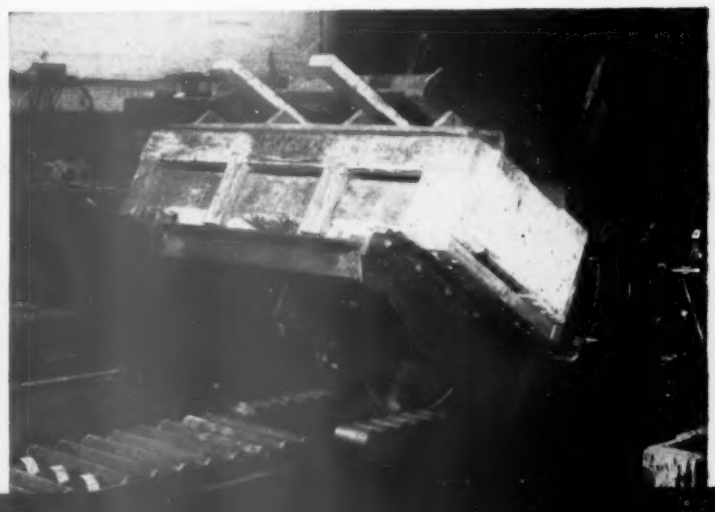
FIGURE 4 shows that the clamp cylinder has been exhausted, releasing the core plate—supporting the core—or bottom board supporting the mold from the turnover frame, thus affecting the draw of the machine. The vibrator operates while the draw action is taking place.

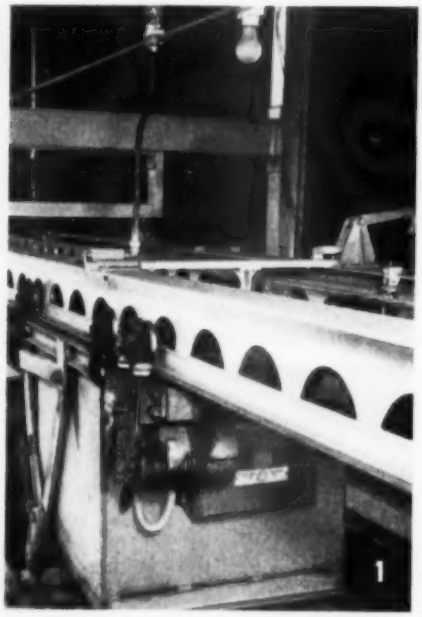


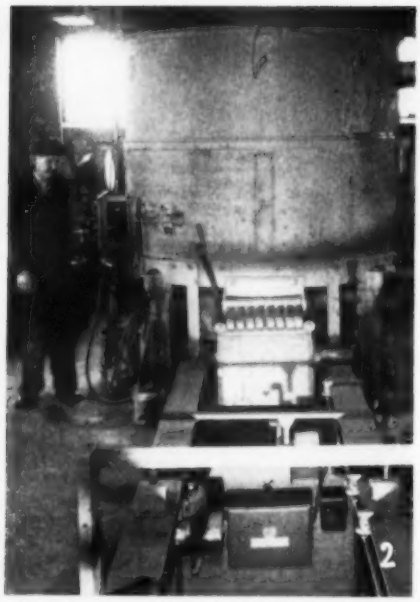
Hard to Draw . . . Short Run . . . Many Different Sizes of Jobs

International Type AN Machine for clamping and turning over core boxes or flasks and for drawing the core or mold. No rigging time is required for this machine. The core box or pattern is fastened to the turnover frame by sliding the cleats that have been fastened to the under side of the box or pattern plate into the grooves with which the turnover frame has been provided. Absolutely no adjustments are required. When boxes or patterns are changed from one size to another, the variations are automatically taken care of, irrespective of how much difference there is in the width, length and depth of the boxes or flasks for which the machine has been recommended.

INTERNATIONAL MOLDING MACHINE COMPANY - La Grange Park, Illinois







Sand Distribution System

Operates Automatically

A SYSTEM for automatically conveying molding sand installed in 1945 at Standard Automotive Parts Co., Muskegon, Michigan, has proved successful in reducing cost of sand distribution with low maintenance expense on the equipment.

The system consists of a motor-driven distributing bucket of 24 cubic foot capacity operating on a double track. It extends out some 200 feet from under the discharge of a muller to pass over a row of molders' sand hoppers, which it keeps filled.

The one man who operates the muller, handles the filling of the distributing bucket and its dispatching. When a molder requires sand, he pulls a lever which sets dogs at the track and lights a signal light. The muller tender, upon seeing the light, dispatches the bucket by pushing a "forward" button. The bucket stops automatically where sand is needed and discharges its load into the hopper below. It then returns to the muller, stopping exactly where wanted without jogging, so that sand can be poured directly into the traveling bucket.

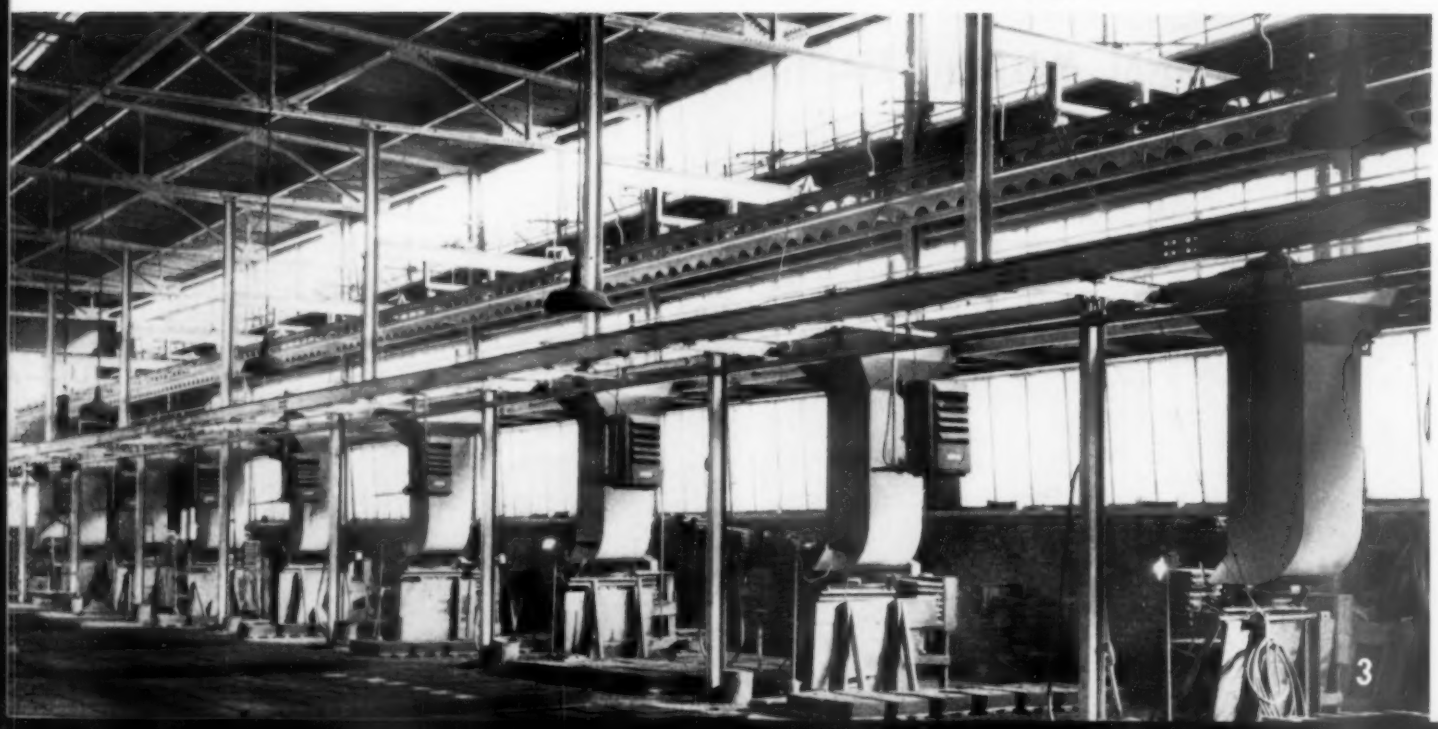
Another station is provided in the line of molders' hoppers, where the distributing bucket can discharge into a molders' hopper mounted on another distributing system below, for transporting sand to other floors on the opposite side of the foundry. This second system is hand propelled, operating on a single-rail overhead track. Both systems were furnished by the Cleveland Tramrail Division, Cleveland Crane & Engineering Co., Wickliffe, O.

The principal advantages of this type automatic system are:

1. Low original cost of equipment.
2. Simplicity of operation. Only one man is required for tending both muller and automatic dispatch system.
3. Low maintenance cost. Only the

(*Concluded on page* 120)

Fig. 1—Traveling bucket en route with load of sand. It stops automatically, discharges in first molder's bin calling for sand and then returns to muller. Fig. 2—Traveling bucket receiving sand at muller. Fig. 3—General view of molding floor, molders' stations and runway of sand dispatch system



COATED PRODUCTS COMMENTS

Grinding with belts in the foundry

The use of belt grinding to speed production and lower cost is receiving widespread attention from many foundrymen. It has been our privilege to work with some in gaining both important production economies and improved finishes.

For instance, we have been successful in getting as much as a 60% increase in the production of malleable iron handles for one foundry. We helped in speeding up by 50% the removal of gates in an aluminum foundry. And for others, we have shown how the correct application of belts for backstand idlers has increased belt life by as much as 33%.

We would like to share our findings with you. Consider the many ways in which belt grinding can be of value to you. If you have a special problem, please call on us. We are always ready to help. Your inquiry will receive prompt attention. Coated Products Division, The Carborundum Company, Niagara Falls, New York.

COATED ABRASIVES BY

CARBORUNDUM

TRADE MARK

Making ALL abrasive products...
to give you the proper ONE

"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company

(*Concluded from page* 118)

eight wheels on the distributing bucket require regular maintenance.

4. Sand mixture can vary as required with each load without contamination.

5. Sand carried in bucket does not lose its moisture content.

6. Sand loss in transportation and delivery is nil.

7. Equipment does not exclude light over molders. It collects little dust and dirt and makes for a cleaner foundry.

8. Convenient auxiliary hand-propelled system can be easily installed to operate in conjunction with the automatic system, enabling delivery of sand to out-of-the-way floors which are temporary or permanent, but beyond those served by the automatic equipment. This method is used at Standard Automotive Parts Co.

9. Automatic handling equipment can be arranged to dispatch bucket loads of sand to one or many points in various sections of a foundry over an overhead Tramrail track and switch system. Stations to which sand is to be delivered can be preselected regardless of what track they are on or on what floor or building they are located. Buckets will transport sand, empty and return automatically.

Technical Reports—

WISCONSIN FOUNDRY CONFERENCE

Space limitations prevented publication in the March issue of reports on all of the technical sessions held during the recent annual Wisconsin Regional Foundry Conference at Milwaukee. Reports on other conference papers are given here

OPENING malleable iron session at the Wisconsin Regional Foundry Conference, with H. C. Stone, Belle City Malleable Iron Co., and M. A. Harder, Lakeside Malleable Castings Co., Racine, Wis., presiding, comprised a discussion and demonstration of "Progress Through Motion Study and Better Methods" by E. Braun and S. D. Martin, Danville Division, General Motors Corp., Danville, Ill.

The speakers demonstrated by proper and improper arrangement of core bench, sand supply and core accessories how core production could be increased considerably with less fatigue to the operator. At the conclusion a motion picture showing improved methods of handling, arrangement of equipment, etc., operating conditions were improved, and operator fatigue held to a minimum.

How sand reacts to the jolt and squeeze was the subject of a talk by W. W. Eichenberger, Milwaukee Foundry Equipment Division, SPO Inc., Milwaukee, at the second malleable session. Entitled "Getting the Most out of Your Molding Machines," the talk, which was slide-illustrated, dealt first with the two operations separately and then with their combined effect. Squeezing, Mr. Eichenberger related, is the more important operation and should do most of the ramming work because it is faster. Jolt ramming alone, however, does a satisfactory job on horizontal patterns. Jolt cycle should be timed so that no pause occurs either immediately after the jolt or at the top of the travel. Momentum and inertia of the sand will undo the jolt's purpose if this is not adhered to.

Because of the importance of the squeeze, trend in new molding machine design is toward larger squeeze pistons, their size being the only important variable factor to consider in obtaining a harder squeeze. The successful use of the jolt or the squeeze depends primarily on capacity of the machine. Never overload, Mr. Eichenberger cautioned.

Session chairman was R. N. Schaper, Wisconsin Appleton Co., South Milwaukee, Wis. Co-chairman was Joseph G. Kropka, superintendent, malleable plant, Chain Belt Co., Milwaukee.

Third malleable session was addressed by P. C. Debruyne, Moline Malleable Iron Co., St. Charles, Ill., who discussed "Foundry Mechanization for a Job Shop." The speaker's presentation was a description of the modernization his company undertook in 1946, amplified by observations on operation of the shop since that time. These facilities were described in considerable detail in THE FOUNDRY for December, 1948, p. 74.

Mr. Debruyne asserted that the modernization has achieved the purpose for which it was designed. It affords a better place to work and attracts more desirable people for jobs. The company makes the practice of hiring unskilled workers, usually placing them in the shipping department and advancing them as conditions permit. An advantage of this policy is that workers come to recognize the quality of work desired before assuming responsible productive posts. The company hires few molders as such, training its own.

N. Amrhein, Federal Malleable Co., West Allis, Wis., served as chairman of this session. Co-chairman was J. B. Gutenkunst, Milwaukee Malleable & Grey Iron Works, Milwaukee.

Leo R. Friedman, National Malleable & Steel Casting Co., Chicago, addressed the final malleable session on the topic "Simple Metallurgy of Malleable Iron." Chairman was John L. McIlhone, metallurgist, International Harvester Co., Waukesha, Wis. Stephen Pohl, Federal Malleable Co., West Allis, Wis., was co-chairman.

Melting practice, not annealing practice, does the most to determine final characteristics of the iron, Mr. Friedman noted. Not overlooking the importance of the malleablizing operation, however, he suggested that its effects are mostly negative—that it can undo what good melting has done, and in only rare instances can it correct damage done through faulty melting.

Annealing Shows Improvement

The industry's greatest improvements probably are in the annealing operations, he remarked, citing as the reason better understanding of the principles involved. Affecting annealing time, in addition to melting practice and chemical composition, are such factors as gases in the furnace atmosphere, furnace design and method of packing.

"Minor Variables In Sand May Cause Major Defects" was the subject for the first gray iron session, with N. J. Dunbeck, Eastern Clay Products Co., Jackson, O., the speaker. Chairman was G. P. Antonic, metallurgist, Walter Gerlinger Inc., Milwaukee, and Leslie Woehlke, Grede Foundries Inc., Milwaukee, was co-chairman.

Although much has been learned of sand control the last 20 years and fine new equipment has been developed, some sand scrap continues, the speaker asserted. Conditions would be improved, he felt, if as much effort were spent in applying what is known as in learning new things. Scrap appears suddenly—some defect such as a blowhole occurs without warning. The cause usually is some gradual and minor changes in sand properties. It is important, Mr. Dunbeck stated, to realize that a minor change in sand properties can cause major defects.

For example, a change of 2 per cent

(*Continued on page* 123)

you get
better
foundry sand
from a

CLEARFIELD
MIXER

This Clearfield 930 Mixer is the center of a complete molding sand conditioning system.

Sand which adheres firmly during both molding and pouring operations must have bond and moisture uniformly distributed. This is absolutely essential for good foundry work—and that's the type of sand which is turned out all the time by Clearfield Mixers.

Clearfield Mixers, with the famous revolving pan and vertically rotating mullers, are available in sizes and models to fit in perfectly with any production setup. So whether your needs are for small quantities of sand at infrequent intervals or a continuous large supply, write for Catalog No. 79 for complete information on the Clearfield Mixer which you require.

CLEARFIELD
MIXER
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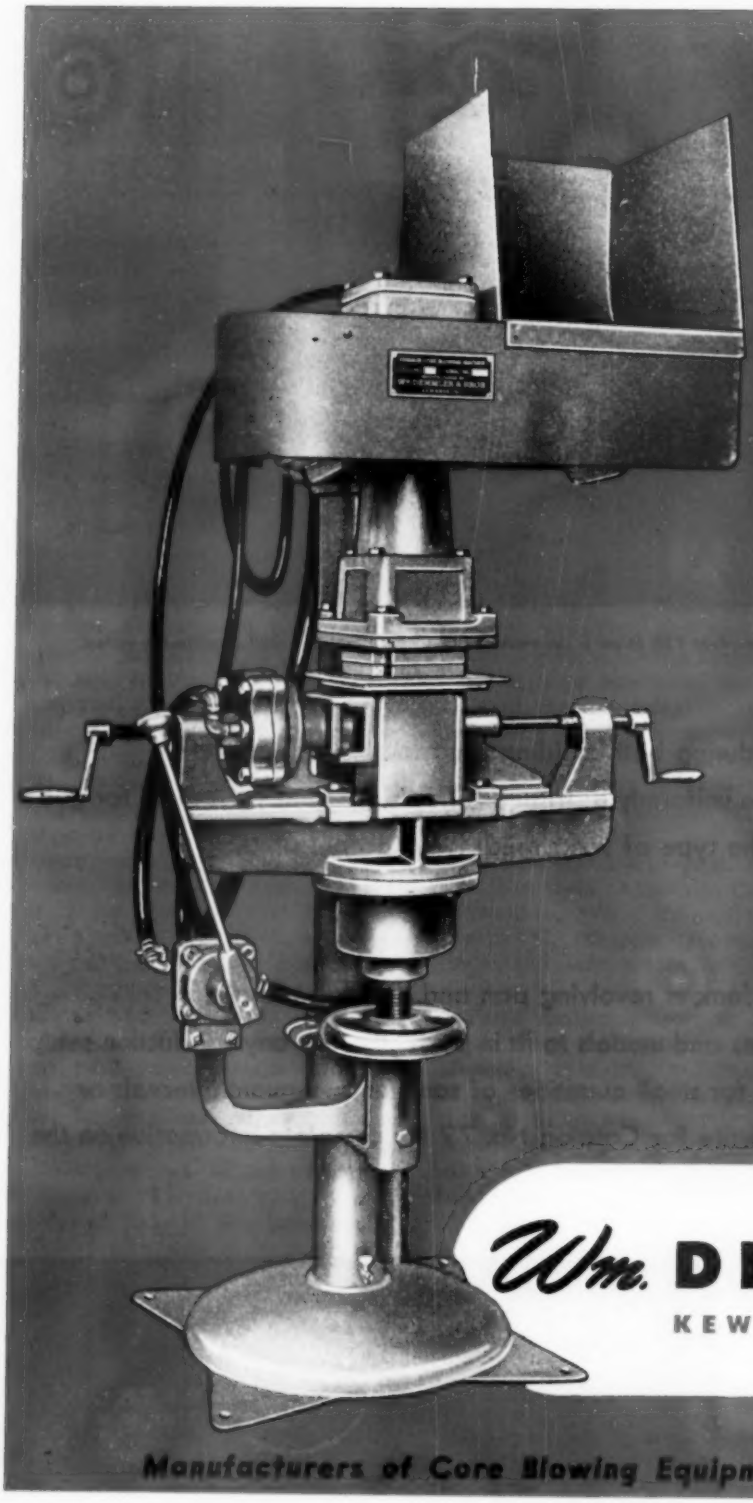
NO. 55 DEMMLER

CORE BLOWING MACHINE



IDEAL FOR FAST, ECONOMICAL PRODUCTION ON SHORT RUN JOBS

Short run jobs can be profitable, too!

The DEMMLER No. 55 is proving it every day . . . day after day in foundries everywhere. This small, rugged, efficient core blower is ideal for blowing cores weighing up to four pounds; was especially designed to fill the foundryman's need for just such work.

Sand magazine and carriage are aluminum castings, mounted on ball bearing rollers for utmost ease in pushing from filling to blowing position.

The DEMMLER No. 55 has *both* vertical and horizontal air operated core box clamps, controlled automatically by the same hand valve that blows the core.

This versatile machine will accommodate boxes 9 inches long, has sliding, quick change blow plates and features a trouble-free diaphragm type blow valve.

Sand magazine opening is 4½ by 9½ inches. Three different sand magazine sizes available.

Simple in construction . . . simple in operation, the DEMMLER No. 55 core blower is the economical solution—the profitable solution—to the rapid production of high quality small cores. Very reasonable in cost, the DEMMLER No. 55 is an extremely worthwhile addition to any foundry, large or small.

Illustrated specification sheet will be sent on request.

Wm. DEMMLER & Bros.

KEWANEE, ILLINOIS

Manufacturers of Core Blowing Equipment Exclusively Since 1911

(*Continued from page* 120)
in tempering water in a fireclay bonded sand will increase dry strength by 100 per cent. Substitution of western for southern bentonite increases dry strength by 100 per cent but at the same time increases hot strength by 1900 per cent.

With no change in the sand, Mr. Dunbeck continued, ramming that gives 65 mold hardness yields 3.3 pounds green compression strength; 82 mold hardness yields 6.8 pounds and 92 mold hardness yields 14.1 pounds green compression.

Speaking at the second gray iron meeting, H. H. Harris, project director, U. S. Navy Research & Development Project, Alloy Engineering & Casting Co., Champaign, Ill., spoke on the "New Evaluation of Casting Process by Navy Research." Chairman of this session was A. R. Janes Jr., Standard Foundry Co., Racine, Wis., with L. B. Koenig, superintendent, J. I. Case Co., Racine, Wis., as co-chairman.

Describe Navy Program

Mr. Harris described and discussed new and improved casting processes and equipment which have resulted from the Navy's intensive research program. These methods covered experimental production of bladed and shrouded steam turbine wheels cast integrally and jet engine rotors cast without inserted blades. The processes embraced centrifugal and counterflow centrifugal or centripetal casting.

The Navy research program is too extensive and involved for brief abstracting. For a complete report on the work, the reader is referred to THE FOUNDRY for November and December, 1949, pages 80 and 86, respectively.

Third gray iron session was devoted to "The Cupola, Its Raw Material and Its Operation." Speaker was B. P. Mulcahy, president, Fuel Research Laboratory Inc., Indianapolis, whose article on the same subject began in the February issue of THE FOUNDRY, page 76. Session chairman was Harold Sohner, metallurgist, International Harvester Co., Milwaukee, with F. W. Busche, president, General Foundries Co., Milwaukee, as co-chairman.

Mechanical simplicity of the cupola, Mr. Mulcahy believes, leads many operators to believe that its chemical action is equally simple. This faulty logic, he says, in turn leads to most of the metallurgical difficulties with its product. These difficulties arise, he contends, from wide variations in the quality and quantity of five main constituents: Equipment, raw material, fuel, air, and accepted mode of operation.

For its concluding session, the gray iron group scheduled a discussion on "Stress Analysis Problems." Speaking on this subject was Francis G. Tatnall, manager of research, Baldwin Locomotive Works, Philadelphia. Leslie Woehlke, Grede Foundries Inc., Milwaukee, was chairman of this meeting and A. R. Janes Jr., Standard Foundry Co., Racine, Wis., was co-chairman.

Mr. Tatnall's message was that of improving casting design through stress analysis. Use of strain gages is the principal working tool in making such analysis. Failure of a casting, he pointed out, usually comes at the weakest point. Furthermore, failure troubles usually are traced back to the designer. Using the black-board extensively, Mr. Tatnall demonstrated procedure in analyzing stresses likely to be encountered in service. A good place to start, he asserted, is with a field failure, then trying to reproduce the failure conditions in the laboratory, meanwhile measuring and analyzing the stresses encountered.

Routing steel castings through the cleaning room was the subject of discussion at the first steel session. Lester B. Knight, L. B. Knight & Associates, Chicago, was the speaker, and Walter Punkow, Wehr Steel Co., Milwaukee, and Otto H. Kraft, Bucyrus-Erie Co., South Milwaukee, Wis., were chairmen. Mr. Knight said that the routing of castings must be solved by each individual foundry. He limited his discussion largely to foundries making castings of 2000 lb maximum. Fifteen to 25 per cent of all operating costs and one-third of the man-hours are usually represented by the cleaning department, and its costs are affected vitally by the efficiency of the molding and coremaking departments.

Mr. Knight traced the usual route in cleaning operations for the seven to nine important phases, commenting on the difference in handling for large and small castings. Incentive pay is difficult to determine accurately but is desirable. Straight-line flow should be adhered to as far as possible. Small castings should be handled from operation to operation with skids and lift trucks, and the castings never should be on the floor.

Second steel session, under the direction of E. G. Tetzlaff, Pelton Steel Casting Co., Milwaukee and G. V. Jedniak, Sivyer Steel Casting Co., Milwaukee, had Charles Locke, Armour Research Foundation, Chicago, as speaker. His topic was mold cavity gas formation as related to steel castings. He discussed the standard AFS permeability test in relation to experimental work conducted at Armour foundation. This was carried on with molds having the cavity entirely surrounded by sand. He limited his discussion to the permeability of sand in the cope portion of the mold cavity. Usual permeability test takes no account of heat, and is made on a sample which is rammed arbitrarily by three blows of the standard rammer. Sand used varied from 12 to 350 permeability and gas pressure in the mold was negligible in all cases.

Third steel session, dealing with "Heading and Gating Practice," attracted much acclaim from the audience. It featured a discussion on the subject by Fred B. Riggan and Harold Schulte, Key Co., East St. Louis, Ill. The authors stated that in the production of steel castings, the management of their company considers the gating and heading operation as

(*Concluded on page* 125)

Shown above at the Wisconsin Regional Foundry Conference, left to right, are: R. C. Woodward, Bucyrus-Erie Co., South Milwaukee, Wis., and president of the Wisconsin Chapter of the AFS; E. W. Horlebein, national AFS president, and Walton L. Woody, national AFS vice president. Photo furnished through the courtesy of Walter V. Napp of Badger Firebrick & Supply Co., Milwaukee

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(*Concluded from page* 123)

the center around which the other operations are geared. It likens heading and gating as the hub of its "wheel of production." The six spokes of this wheel are (1) pattern construction, (2) design, (3) yield, (4) cost, (5) quality, and (6) delivery. All of the spokes are equally important to support the rim and allow the wheel of production to roll.

In their discussion, the authors considered each factor in detail, using slides to illustrate procedures which have proved most effective. These included changes in heading and gating to simplify and speed production.

Anthony M. Herrmann, superintendent, Steel Foundry Division, Belle City Malleable Iron Co., Racine, Wis., was chairman of this session, and co-chairman was Eugene Schneider, superintendent, Milwaukee Steel Division, Grede Foundries Inc., Milwaukee.

The fourth steel session was keyed to the subject "Product Development" and featured as its speaker W. J. Phillips, director of castings development, Steel Founders' Society of America, Cleveland. Serving as chairman was Charles Fuerst, assistant to superintendent, Falk Corp., Milwaukee. Harold Ziebell, ceramic engineer, Crucible Steel Casting Co., Milwaukee, was co-chairman.

Purpose of Mr. Phillips' presentation was to show that steel casting producers must take steps to regain the applications lost to weldments or forgings. In doing so, however, there must be good reason for the change, price included. His recommendation was—get the facts, then use foundry tools to the best advantage to do a better job.

Mr. Phillips stated that the society is starting a program Apr. 1 to acquire basic engineering information to aid steel foundries in promoting steel castings to best advantage. The need is for specific information where none is now available or is inadequate.

Issues Folder On Ferrous Castings

Belle City Malleable Iron Co. and Racine Steel Castings Co., Racine, Wis., has issued the ninth in the present series of postwar folders on ferrous castings. Purpose of the illustrated folder is to point out that human care and judgment play a large part in the production of castings.

It suggests that just as more goes into the prescription filled at the drug store than mere chemicals and drugs, so, also, more goes into castings than the molten metal.

INVENTORY CONTROL

(*Continued from page* 85)

Method 1, although costly to maintain has the advantage of daily control in both quantity and value. It also provides for pricing each requisition daily, which reduces the peak load at the end of the accounting period as would be the case in Method 2.

When materials or supplies are used for the same department or operation, Method 3 eliminates the effort of issuing requisitions and consequent handling and pricing.

When using any of the preceding methods the cost of receipts of materials and supplies, as shown on purchase invoices, are entered to the "Received" section of the Material record, and added to the inventory.

At the close of the accounting period, the costs shown on the purchases invoices are summarized and the total entered to the debit of the general ledger supplies account.

At the close of the accounting period the costs of all entries to the several material record cards are summarized and the total entered to the credit of the general ledger supply account.

To prove the accuracy of the clerical work involved in the maintenance of these records, it is well to compare the sum of the last inventory values on all material record cards with the "Balance" shown on the supply ledger account.

At the close of the accounting period, the latest values shown on the material records are added by classes as shown on Diagram 5, and made a part of the management report illustrated.

Work in Process and Finished Castings—There are good systems in use that record the costs of castings as they progress through the several production operations. There is no one best system recognized as such by the author. However, THE FOUNDRY has published from time to time details of meritorious systems founded on sound and sensible principles.

Any system of reporting the number of castings on hand at the close of an accounting period may be used. However, the method of correctly measuring the inventory values must include the cost of metals at the spout plus the direct labor and overhead up to and including the last operation performed.

The inventory values of finished castings are determined in the same manner as work in process.

If correct and reasonable inventory values of work in process and finished castings are to be had the following costing practices must be avoided: Using percentages of sales; using average cost per pound; using overhead rates based on direct labor dollars; disregarding yield in good castings in pricing costs of metal at spout; the pernicious use of averages to save clerical cost.

Management Reports—As a management control instrument the form shown on Diagram 5 is recommended. The procedure consists of:

Preparing a budget sheet, similar in form to the one illustrated for March, 1950. This sheet is placed in a multiple ring binder, in the first position at the left.

At the close of each accounting period, a comparative statement is prepared showing the inventory values of the several major items. These sheets are placed in the binder as shown on the diagram.

The items shown on the diagram are used only to illustrate the method. Each individual company may practice the same method by using its own inventory items. Should further analysis of any item be needed the cost department should be prepared to furnish a special statement to management. If this further analysis is to be needed for each accounting period, comparative statement sheets similar in form may be arranged and filed in the binder.

This illustration shows comparisons of percentages of each item to the total inventory. However, these percentages may be expressed by pounds of castings produced, or on any other base that will assist management in the control of inventory.

This method is extremely flexible and has a tremendous comparison advantage over methods that report all operating data (including inventory) in one report for the month's operation, as this method allows for quick comparisons of each item with an established budget as well as each period with the other periods.

The illustration shown on Diagram No. 6 indicates the position of the inventory on the quarterly balance sheet. This form of balance sheet may be prepared monthly if desired; the form would be the same.

Note the same style of statement as was explained for the comparative statement shown on Diagram No. 5. The only difference is the visibility of both total amounts and percentages.

By following the procedures set forth, the following advantages will result:

1. The value of inventories shown

on the balance sheet of the company represents a correct measure of investment monthly instead of only at the end of the year's operations.

2. There is no delay in preparing yearly operating statements due to the time taken to count or weigh the many items making up the inventory, also the time required to price and calculate.

3. Maintenance of the monthly comparative statements brings to the attention of management the trends of inventory quantities and values in respect to their relationship to production. Irregularities that suggest managerial action are reported currently during the year rather than at its close, when opportunity for correction has been lost.

It is hoped that a careful study of these procedures may be of material assistance to the management of some foundries in checking their own procedures to ascertain if improvements should be made.

Methods of Metal Removal Studied

Steel Founders' Society of America, Cleveland, is investigating and evaluating all known information on the removal of excess metal normally developed in the production of steel castings. The society plans to restudy all established methods for removing gates, risers, feeding pads, fins and other protuberances, and will conduct an independent investigation of latest developments in the field.

Experimental studies are being made in a selected steel foundry with the co-operation of a recognized university engineering and research organization. Member foundries are contributing individual experience records and pooling information of equipment and suggestions on possible design changes or new equipment.

Charles W. Briggs, society technical and research director, is in charge of the program.

Change of Address

Gray Iron Research Institute Inc., formerly of 43 West Long St., Columbus 15, O., has moved to 1300 Grandview Ave., Columbus 12, according to D. E. Krause, executive director. The telephone number is Kingswood 4575.

Murrietta Mfg. Co., Murrietta, Calif., lost its die casting machinery in a $30,000 fire Feb. 3.

Which Molding Method?

(*Continued from page 89*)

amount of unnecessary work. In their estimation two deep narrow gates on the second side, similar to those on the first side, will serve adequately. The argument has some weight, but not enough to overbalance the method shown. Swiftly flowing metal from the second set of gates will heat the sand in its path to a greater degree than the sand over the remainder of the mold face. The difference in temperature and the force of the stream may set up an erosive action and produce a rough surface on the casting. The pop gates distribute the metal in relatively small quantities all over the mold face, with consequent uniform temperature in the sand.

An alternative type of gate, presenting certain advantages and disadvantages, is shown in Fig. 5. Principal advantage is that it is simple and easy to apply. Where two cranes and two ladles are employed, they can be brought into position much more readily than where the mold is gated from both sides. Of course, this objection does not apply where a jib crane or wall crane, traveling on a level below the upper wide span crane, is hooked to the second ladle. A second advantage is that the metal can be introduced gently and slowly through the bottom gate at each end, until the lower part of the vartical part of the mold is nearly filled. The remainder of the metal may be rushed through the upper gates.

The main objection to the method is that metal entering at the bottom of a mold, is in opposition to the theory that solidifying or freezing of a casting should commence at the bottom and progress gradually upward, thus bringing the hottest metal to the top where it can function properly while compensating for natural shrinkage. A second disadvantage is that the bottom gates cease to function early in the program. The upper gates cannot deliver sufficient metal to fill the large flat plate at a speed that represents good practice.

Since the casting is of uniform thickness, no feeding risers will be required. A qualification to this statement applies to all castings, especially castings with high vertical walls. In a strong, stiff rigid mold—for example, in a dry sand or loam mold—a casting will not strain at or near the bottom. With a weaker mold, either sand or flask, the mold will strain when it is filled with metal. As a result the metal at the top sinks more or less. The molder blames this on the metal and insists on a feeding riser. The diagnosis is not correct, and the proposed remedy is not the proper one. In fact, the added height of the riser, or the usual pumping with a rod will accentuate the trouble instead of curing it. Occasionally the iron is responsible. Some irons shrink more than others. Rigid mold or no rigid mold the castings must be fed through adequate risers.

While making the angle plate mold it is highly important to vent the sand inside and, to a lesser extent, outside the pattern. A coke bed with suitable vent pipes is incorporated in the inside sand body. On account of the brackets the coke bed is divided into three sections.

Vent the Corner

The top of the pattern is merely a skeleton or open frame. After the cope is lifted off, the sand in the drag is vented generously with a wire down to the coke. A scraper is employed to remove the extra thickness of sand inside the frame. The frame then is removed and the right angle sand corner where the vertical member joins the horizontal member is vented down to the coke bed. Vents about 2 in. apart will prevent the sand from scabbing in this area. This is a very important item.

The sharp corner at each side of the two brackets is vented in a similar manner with a wire. Vents are shown in Figs. 3 and 4. Action of the scraper closes the top of the vent holes over the face of the flat plate. Vent holes in the corners are closed during the process of cutting and finishing the fillets.

Sand on the inside and outside of the vertical walls is vented by rows of rods 2 to 3 ft long set up about 6 in. apart and from 2 to 3 in. away from the pattern. The rods are drawn up as the ramming progresses. The inside rods are withdrawn at the coke bed level. The outside rods are left in place until after the cope has been removed from the mold. Then they are removed with a pair of pliers, or a hook, if the rods are looped at the top, or have a hole drilled through near the top. A shallow channel is scratched in the joint face of the drag to conduct the gas from each upright vent hole to a point outside the mold.

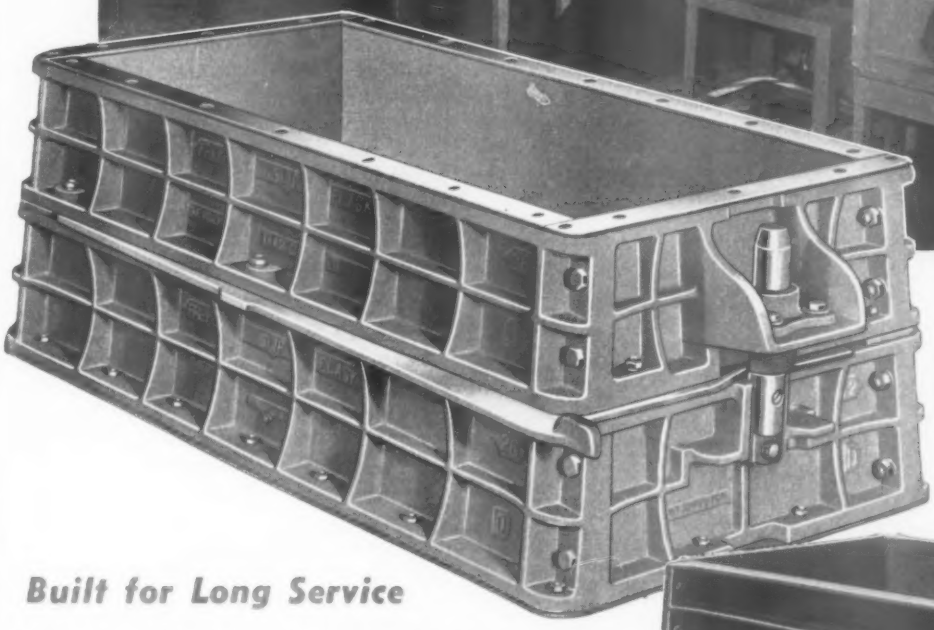
A suggested form of pattern construction is shown in Fig. 1. If the pattern is built up solid as a single

(*Concluded on page 128*)

FREMONT FLASKS

Thrive on daily punishment of machine molding at American Wheelabrator

Courtesy of American Wheelabrator and Equipment Corporation



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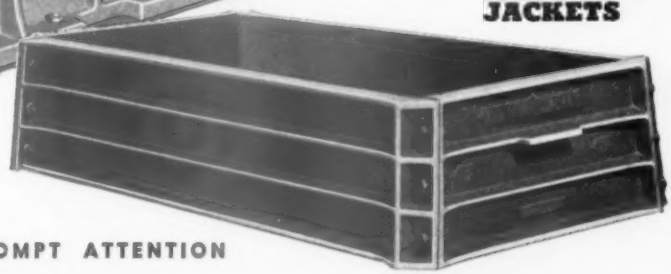

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GROOVLOCK

THE FOOL-PROOF PIN

THE FREMONT FLASK CO.
Fremont, Ohio

(*Concluded from page 126*)

unit, as it might be by a man not familiar with foundry practice and requirements, it will be heavy and clumsy and awkward to handle. In the suggested form the various items —vertical wall, horizontal plate and the two brackets—are constructed separately and assembled temporarily in the flask or pit before molding begins.

The vertical member is a solid panel made up of upright 1-in. boards, attached front and back to a 2 x 4-in. framework. A suitable flat steel lifting strap with an eye at the top and a toe at the bottom is let into a recess extending from top to bottom in each end of the panel. Even with a generous draft allowance on the inside and outside faces, considerable force will be required to start and to lift the 5-ft deep slab.

The horizontal member is an open frame attached to the vertical member by three cleats 6 x 8-in. and 1-in. thick. At the opposite side two wood plugs pass through holes in the frame, and into corresponding holes in the outer ends of the brackets. Similar plugs in the vertical member hold the inner ends of the brackets in proper position during the assembly period and until sufficient sand has been rammed around them. Cleats and plugs are removed after a sufficient amount of sand has been rammed around the parts to hold them firmly in proper position.

Beginning the molding operation, the pattern is assembled in the pit, and then with a spirit level the upper plate is adjusted true and level in both directions and flush with the floor. This is one of the minor points which indicate whether the molder knows his business or not. A brick is inserted under each end of the vertical plate, and standards are erected under the outer corners of the horizontal plate. A wedge on top of each support enables the molder to adjust the pattern to the correct position. After facing sand has been rammed under and around the bottom of the vertical member the wedges are removed from the bricks and the spaces filled with sand. Wedges on the high standards are removed when the sand is rammed high enough to support the horizontal frame.

Two methods are practiced to support the heavy cope and prevent it from crushing the mold. In the first method a cast iron or steel standard is erected on a plate in the bottom of the pit, at each of the four corners, and in line with a corner of the cope. Each standard may be in one piece, or built up in two or more sections. In the second method, the standards are omitted. A short piece of rail or a piece of plate is hammered down flush with the joint face of the drag at each of the four corners where the cope will rest on the joint.

In this connection it may be pertinent to point out that while in many instances it is quite safe to place weights directly on a cope, the practice is not safe where the weights are extra heavy. In the latter case the weights are placed on rails or binder bars, which in turn rest on supports beyond the cope. With the weights in place, wedges are driven between the rails, or binders, and selected points on top of the cope.

Method of venting and reinforcing the sand in the mold is shown in Fig. 3. Vents from the flat face of the horizontal plate terminate in a layer of coke in three sections, one between the brackets and one on the outside of each bracket. Inside and outside vents already have been described. Position of a row of steel bars, pipes, or wood stakes is shown at A. Short steel reinforcing rods laid at each course of sand inside and outside is indicated at B. Position of long upright vents inside and outside is shown at C.

Coat the Mold Faces

Two methods are available where it may be advisable or necessary to cover the vertical walls of the mold with a protective coating. In the first a tapered print is attached to the pattern on the outside of the vertical face. After the pattern is removed, three 32 x 60-in. slab cores are lowered into the print. At the top each core is anchored by a double wire strand to a short bar driven into the sand.

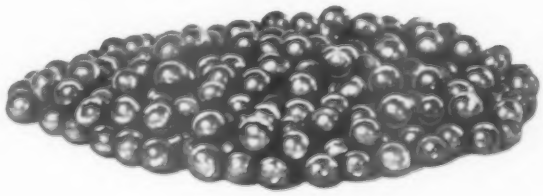
In the second method a large core print, 12 in. wide at the bottom and 16 in. wide at the top, is attached to the pattern. After the pattern is removed the sand wall left by the print is covered with parting sand, or preferably with sheets of paper. A lifting plate is adjusted in the bottom and sand is rammed until the space up to the top of the pattern is filled. After the pattern is removed from the mold, this body of sand is lifted out and a refractory coating is applied to the inside and outside vertical faces of the mold. The drawback then is returned to place. Under certain conditions, the inside and outside faces may be blackwashed and skin dried.

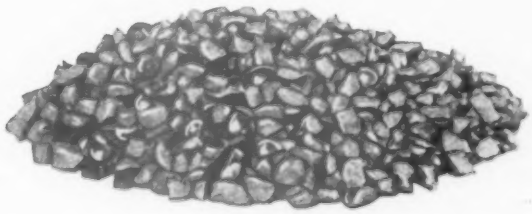
Instead of using the ordinary iron or steel cope, the mold may be covered with a number of dry sand slab cores, approximately 2 x 7 ft. The width may vary inside any convenient limits for any multiple of 10 ft. The two measurements 7 x 10 ft, provide a 1-ft bearing space at the ends. The two foregoing methods are illustrated in Figs. 6 and 7.

BRITISH FOUNDRYMEN: Members of the United Kingdom gray iron founders team of 15 men who recently visited American foundries in a tour sponsored by the Economic Cooperation Administration are shown here at the Crane Co.'s Chicago works, watching molten iron being transferred to a pouring ladle. At a press conference in New York, prior to sailing for home, Samuel H. Russell, S. Russell & Sons Ltd., Bath Lane, Leicester, leader of the group, compared skills, safety regulations, apprentices, relations between trade unions and management, production, efficiency, and methods in British foundries with those studied in the tour of 16 plants in this country

Swim suits by Jantzen

Good things come in *Pairs*





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ANNEALSHOT by *Metal Blast*

By EDWIN BREMER

FOUNDRY Developments

STUDY of 32 experimental steel heats produced by surface blowing in a basic-lined hearth in a co-operative research program of Carnegie-Illinois Steel Corp. and Battelle Memorial Institute and reported by Sims and Toy at the annual meeting of the American Institute of Mining and Metallurgical Engineers indicates that the process is chemically sound and metallurgically feasible. Properties of the steels are the same as open-hearth of the same composition; nitrogen can be maintained at about 0.003 per cent; up to 97 per cent P and up to 50 per cent S can be eliminated, and the fumes produced were definitely less dense than in acid bessemer practice.

* * *

ONE casting producer employing the investment molding process points out that certain limitations should be borne in mind during the preliminary stages of design. While a great many products have exceeded those limitations in one or several respects, the following should be considered more as an optimum range for parts to be precision cast, and can be used as a working guide: Minimum weight—2000 pieces per lb; maximum weight per casting—1 lb; longest dimension per casting—8 in.; thinnest continuous section over very limited areas—0.020-in., over extensive areas—0.040-in.; thinnest edge on an angle of 20°—0.015-in., but on more obtuse angles the thickness may be reduced.

* * *

IN THE near future the Navy will adopt an oil-powder method for detecting surface cracks and other discontinuities in metals and other dense materials. Developed by the U. S. Navy Engineering Experiment Station welding and chemical engineers for examination of diesel engine frames, the procedure involves use of a colored penetrating oil and a dull white powder. The oil is applied to the surface to be inspected for a minute and removed. Then the powder is dusted on, and in a short time any cracks or surface flaws are revealed as sharply defined red lines on a dull white background. Indications may be photographed by normal procedures for close-up views. Powder does not contain abrasive particles and can be applied near bearings and other close fitting parts.

* * *

ENTROPY values of 800 elements and inorganic compounds are given in Bureau of Mines bulletin No. 477, "Contributions to the Data on Theoretical Metallurgy XI. Entropies of Inorganic Substances. Revision (1948) of Data and Methods of Calculation" by K. K. Kelley. Greatest use of entropy data is for determining the free energy available for proposed reactions—knowledge adequate for determining whether or not a reaction will occur, and if so, to what extent within practical limitations. Copies of the bulletin may be obtained from the superintendent of documents, U. S. Government Printing Office, Washington 25, for 30 cents each.

* * *

SIMPLE inexpensive method for mounting metallurgical specimens at temperatures only slightly above room temperature without external application of heat has been developed by Denton L. Smith, National Bureau of Standards. Technique employs a denture material of modified acrylic resin consisting of a polymer and a monomer which, when mixed in the proper proportions, will polymerize or set under pressure at room temperature. Method developed at the bureau may be carried out in 15 to 30 minutes depending upon room temperature with an inexpensive mold and a clamp or vise. Block of resin ½-in. thick cured in a brass mold gave a temperature rise of 60° C (108° F); ¼-in. thick 23° C (41.4° F), and ⅛-in. thick 10° C (18° F).

* * *

INVESTIGATION of "Mechanism of Grain Refinement of Sand Castings in Aluminum Alloys" by A. Cibula as published in the December, 1949 issue of the *Journal*, Institute of Metals (London), indicates that the nuclei resulting in refinement are carbides of the grain-refining metals. They contain carbon atoms in interstitial positions in simple metal-lattice structures whose dimensions are similar to those of the aluminum lattice. Certain transition metals, notably chromium and manganese, form complex carbides whose structures differ markedly from that of aluminum, and do not cause grain refinement.

* * *

NEW vinyl resin coating has been designed to meet a wide range of surfacing requirements involving moisture and chemical resistance. It is recommended for service over an operating temperature range of minus 40° to 160° F, wet or dry. It is resistant to alkalies, mineral acids, is insoluble in alcohols, greases, oils and aliphatic hydrocarbons, and has a low permeability to water vapor and low water absorption. An applied film of the material is nonflammable and imparts neither taste, odor nor toxicity, and may be used without contamination on surfaces which come in contact with foods, beverages or pharmaceuticals.

* * *

INDUSTRIAL and commercial users of insulation will find the newly issued 36-page standard CS117-49 "Mineral Wool Insulation for Heated Industrial Equipment" published by the Department of Commerce provides guidance for applying mineral wool insulation to sheet metal and brick surfaces as well as specification data. The latter include density, thermal conductivity, incombustibilty and other physical information of value to industrial buyers and specifiers.

* * *

SOMEWHAT unusual, but not new is the procedure of refining metals and alloys by filtering through suitable media while in the molten or semi-molten state. Method has been applied to lead, zinc, aluminum alloys, and aluminum-magnesium melts. Details of the practices employed and results obtained are described in Bureau of Mines Report of Investigations 4614 entitled "Refining Metals and Alloys by Filtration" by H. W. St. Clair.

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FOUNDRY Statistics

Ingot Brass and Bronze

(Shipments in net tons)

	1950	1949
Jan.	18,874	19,456
Feb.	.....	15,026
Mar.	.....	14,550
Apr.	.....	10,695
May	.....	11,114
June	.....	9,696
July	.....	10,220
Aug.	.....	14,194

Source: Ingot Brass and Bronze Industry.

Foundry Production Workers

ESTIMATED NUMBER:

Type Foundry	Nov. 1949	Oct. 1949	Nov. 1948
Iron & steel	168,800	171,400	233,900
Nonferrous	62,400	64,100	74,000

AVERAGE WEEKLY EARNINGS:

Gray Iron	$54.42	$55.84	$59.16
Malleable Iron	51.49	52.32	60.47
Steel	56.33	55.28	62.42
Nonferrous	61.89	62.37	61.54

AVERAGE WEEKLY HOURS:

Gray Iron	37.4	38.3	40.8
Malleable Iron	33.9	34.4	39.5
Steel	36.7	36.2	40.8
Nonferrous	39.0	39.5	39.7

LABOR TURNOVER RATE (NOV.)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	3.6	4.2	1.0	2.9
Malleable Iron	3.4	5.8	0.7	4.8
Steel	3.0	4.2	0.5	3.5

Source: Bureau of Labor Statistics.

Index of Foundry Equipment Orders

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1949	1950
Jan.	149.9	159.3
Feb.	144.4	....
Mar.	190.8	....
Apr.	172.0	....
May	121.9	....
June	164.9	....
July	146.6	....
Aug.	127.1	....
Sept.	166.6	....
Oct.	133.5	....
Nov.	270.4	....
Dec.	201.0	....

Note: Figures are percentages of the base period 1937-1939 taken as 100 per cent (monthly average). Source: Foundry Equipment Manufacturers Association.

Shipments of Castings

(Reported by Bureau of the Census)

Gray Iron

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1947			
Total	12,540,960	7,181,299	.....
1948			
Oct.	1,148,422	642,485	2,522,831
Nov.	1,099,827	606,380	2,406,737
Dec.	1,110,512	624,739	2,284,348
Total	12,785,909	7,131,405	.....
1949			
Jan.	1,040,343	573,164	2,064,861
Feb.	986,591	535,163	1,857,403
Mar.	1,074,704	567,041	1,639,465
Apr.	929,307	467,433	1,445,532
May	866,631	439,420	1,243,266
June	905,573	455,442	1,086,989
July	696,915	341,657	1,031,963
Aug.	872,013	445,981	1,048,308
Sept.	880,647	459,014	980,070
Oct.	715,685	397,939	955,100
Nov.	718,703	395,107	938,629
Dec.	862,172	440,166	892,458
Total	10,549,284	5,517,527	.....

Malleable

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1947			
Total	895,054	513,228	.....
1948			
Dec.	79,882	43,397	137,385
Total	933,265	525,212	.....
1949			
Jan.	71,876	38,040	126,393
Feb.	66,744	35,074	118,318
Mar.	72,052	38,143	102,379
Apr.	61,329	31,728	94,958
May	54,572	27,643	78,944
June	59,597	32,639	69,865
July	44,360	23,216	70,796
Aug.	58,121	30,327	61,330
Sept.	60,488	30,646	57,512
Oct.	57,150	28,582	54,322
Nov.	49,439	25,250	55,795
Dec.	57,379	29,679	60,835
Total	713,107	370,967	.....
1950			
Jan.	62,874	32,918	62,307

Steel

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1947			
Total	1,625,055	1,203,504	.....
1948			
Oct.	152,983	114,819	424,460
Nov.	146,835	110,275	395,013
Dec.	157,395	116,285	354,458
Total	1,760,032	1,335,295	.....
1949			
Jan.	140,577	103,503	338,889
Feb.	135,042	99,425	320,202
Mar.	138,889	102,027	284,754
Apr.	119,953	83,277	250,506
May	106,178	75,537	191,473
June	116,052	84,112	173,237
July	78,710	50,124	155,494
Aug.	89,964	59,412	143,566
Sept.	86,502	55,853	127,664
Oct.	70,690	48,263	124,817
Nov.	76,437	50,685	117,865
Dec.	84,508	53,079	122,887
Total	1,243,502	865,297	.....

Aluminum

(Thousands of pounds)

	Shipments Total	Sand	Perm. Mold	Die	Unfilled *Orders
1947					
Total	441,996	155,112	174,515	110,538	.....
1948					
Oct.	35,542	11,733	13,216	10,158	65,538
Nov.	34,550	11,410	13,012	9,640	63,767
Dec.	31,836	10,335	11,589	9,290	59,154
Total	424,490	139,781	161,334	118,738	.....
1949					
Jan.	29,142	9,702	10,386	8,490	55,580
Feb.	27,228	9,286	9,339	7,795	52,916
Mar.	27,478	9,348	9,386	7,999	50,508
Apr.	23,801	8,041	8,353	6,876	45,638
May	21,392	7,382	7,293	5,994	41,460
June	23,261	8,668	7,790	6,257	38,159
July	18,621	6,311	6,592	5,180	36,993
Aug.	23,997	9,048	8,326	6,119	38,130
Sept.	27,546	9,923	9,491	7,623	38,179
Oct.	29,071	9,634	9,923	8,908	37,881
Nov.	26,317	9,212	8,315	8,348	36,846
Dec.	26,762	10,070	7,714	8,430	36,921
Total	304,616	106,825	102,908	88,019	.....

Magnesium

(Thousands of pounds)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1947			
Total	7,693	7,050	....
1948			
Oct.	708	650	3,070
Nov.	728	683	3,416
Dec.	754	695	3,455
Total	8,214	7,488	....
1949			
Jan.	822	761	3,821
Feb.	813	756	3,586
Mar.	879	800	3,227
Apr.	726	669	3,234
May	778	726	2,885
June	799	759	3,025
July	689	637	3,073
Aug.	753	712	3,107
Sept.	727	691	3,015
Oct.	796	763	3,050
Nov.	801	769	2,399
Dec.	781	738	2,216
Total	9,364	8,781	....

* For sale only.

Copper-base Alloys

(Thousands of pounds)

	Shipments Total	Sand	Perm. Mold	Unfilled *Orders
1947				
Total	1,051,742	960,732	51,139	.....
1948				
Oct.	91,311	82,463	5,293	62,571
Nov.	86,497	77,751	5,107	60,892
Dec.	88,182	79,750	4,796	53,671
Total	1,030,825	930,790	59,009	.....
1949				
Jan.	76,348	68,379	4,593	48,124
Feb.	68,776	61,278	3,951	40,517
Mar.	70,173	62,557	3,927	37,646
Apr.	59,573	52,837	3,458	32,746
May	53,699	48,004	2,830	30,926
June	52,616	47,678	2,552	26,786
July	43,273	39,372	2,129	26,013
Aug.	58,055	53,203	2,929	26,071
Sept.	60,771	55,221	2,729	26,527
Oct.	58,249	52,861	2,316	23,634
Nov.	61,818	56,669	2,811	23,625
Dec.	63,873	58,291	3,086	23,435
Total	725,318	654,444	37,311	.....

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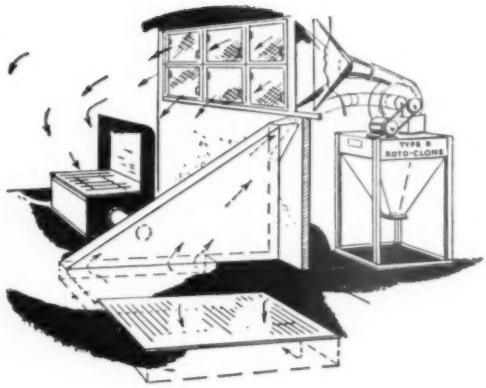
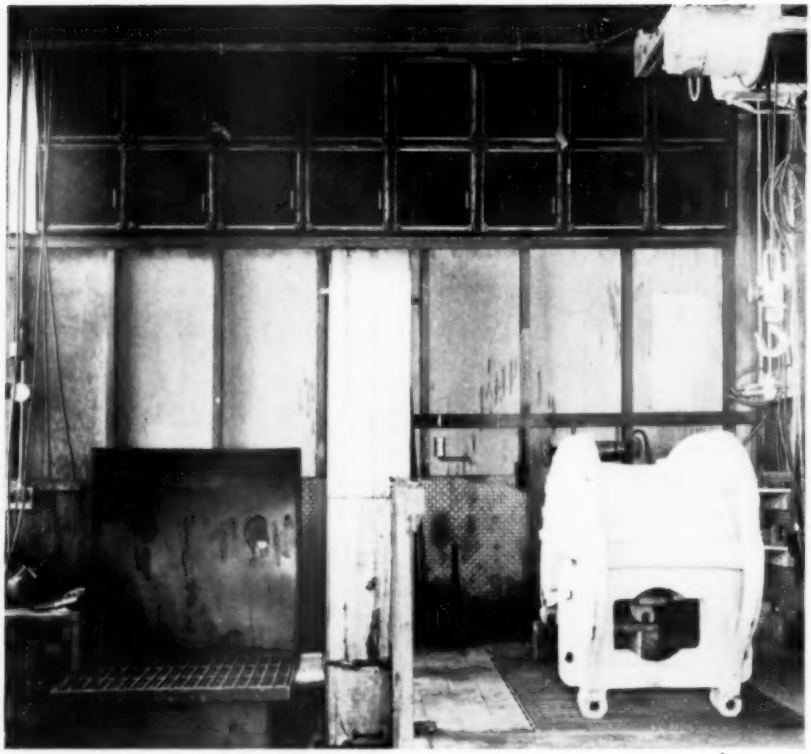
solves "twin" dust problems





HERE'S a potential dust storm that never materialized. Pictured at left are "twin" grinding operations for finishing both small and large castings. Double Trouble? Not a bit—the combined dust load is handled efficiently and economically by a Type D Roto-Clone*.

Now examine the drawing above. Note how the dust-laden air is drawn from both the down draft bench and floor grating into a common plenum chamber and then into the Roto-Clone. Dust is discharged into the hopper and the air is exhausted through a bank of AAF Type M/W4 viscous unit filters for final cleaning before recirculating to the working area.

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ROTO-CLONE®
DUST CONTROL EQUIPMENT

PROPERTIES OF COPPER-BASE CASTING ALLOYS

Castings which must have high electrical and thermal conductivity mainly are made of pure copper alloys. Those properties parallel each other and additions of other elements to pure copper affect them in a similar manner. Provided that correct foundry technique has been employed, the conductivity of the casting depends essentially on its chemical composition. Conductivity is decreased by any element that enters into solid solubility with copper. For example, silver which has a higher conductivity than copper, will reduce the overall conductivity when added to it. Lead which has almost negligible solubility in copper does not reduce electrical conductivity.

Electrical conductivity is decreased in different degrees by different elements; some greatly and others not so much. For example, 0.1 per cent Si will lower conductivity to 65 per cent, 0.1 per cent Al to about 90 per cent, and 0.1 per cent P to about 50 per cent. Tin, nickel and zinc also decrease the conductivity considerably, but the effect is not as severe. For example 1 per cent Sn reduces electrical conductivity to approximately 55 per cent, 1 per cent Ni to around 60 per cent, and 1 per cent Zn to about 90 per cent. Since most specifications on copper castings for electrical purposes require a minimum conductivity of 85 per cent, it is evident that electrolytic copper must be used in conjunction with most careful foundry technique.

If suitable castings are to be produced, proper melting practice is essential, and several methods commonly are employed. One involves a heavy copper cover of dry charcoal during the entire melting operation. The copper is heated to about 100° F above the pouring temperature, the crucible removed from the furnace, and the charcoal skimmed from the metal surface. Then the copper is stirred slowly with a previously dried graphite rod which enables the hydrogen to escape either as molecular hydrogen due to decreasing temperature, or as steam due to oxygen introduced into the metal by the stirring action. Immediately prior to pouring 1 per cent Zn or 0.02 per cent P (2 oz 15 per cent phosphor-copper per 100 lb) is added to the melt.

Another procedure is to melt without any flux in an oxidizing furnace atmosphere. Similarly the metal is heated to 100° F above the pouring temperature, and previous to pulling the pot, a test specimen is poured in a dry sand mold. Suitable specimen is 6 in. long 4 in. wide and 1½ in. deep. If the metal is in proper condition the top surface of the bar will show shrinkage while a raised surface indicates presence of gas. Usually the gas content can be reduced by addition of copper oxide, and reheating for 15 minutes. Another test sample is poured, and if necessary the oxide treatment should be repeated.

After removing from the furnace the copper should be skimmed carefully and allowed to cool to the pouring temperature. Sufficient phosphor-copper should be added so that between 0.01 and 0.02 per cent P remains in the metal. Usually 1 to 2 oz per 100 lb is used. Other deoxidizing agents containing lithium, boron, calcium, magnesium, aluminum, silicon, or beryllium may be employed in controlled quantities so that electrical conductivity is not reduced.

Since copper has practically no solidification range, gates, risers and runners should be adequate to feed the casting properly, and if necessary chills should be used to drive the shrinkage to points where it can be fed. Mechanical properties of copper castings are rather low and in the range of 20,000 psi tensile strength, 6000 psi yield strength, 35 per cent elongation in 2 in., and brinell hardness about 45.

Tin bronzes and red brasses, containing over 3 per cent Sn and less than 12 per cent Zn, may be considered as a group since their metallurgical characteristics and foundry handling are somewhat similar although castings made from the alloys may range from ornamental pieces to bells. Principal alloying elements in the group are Sn, Pb and Zn, and nomenclature for copper-base alloys indicates the nominal composition in terms of Cu, Sn, Pb and Zn respectively.

While mechanical properties are associated directly with the quantities of Sn and Zn present, Sn is of greater importance in affecting alloy characteristics. Approximately 16 per cent Sn can enter into solid solution with Cu at about 1100° F under equilibrium conditions and in the absence of other elements, but at room temperature only a small amount remains in solution. Zinc and other elements are added to alter the characteristics, and those act similar to Sn, but to a lesser degree. For example, 1 per cent Zn has an effect of about 0.5 per cent Sn.

Since the cooling rate of castings is high, equilibrium conditions are never reached, and that affects the properties of the alloys. For example Sn beyond a few per cent forms a compound called the delta (δ) constituent which is extremely hard and brittle. Amount of delta is controlled by cooling rate of the casting; slow cooling decreasing the amount of delta. Hence, if casting conditions are not the same, different properties may be obtained from the same alloy.

In addition to Cu, Sn and Zn most alloys contain some Pb to improve machinability, but beyond 2 per cent Pb there is little improvement in that property. In bearing bronzes Pb is present in substantial amounts to provide a soft matrix for the hard crystals which support the load. In alloys where Pb is less than 2 per cent, it has little effect on the cold mechanical properties, and therefore, alloys of the G metal type preferably should contain a little Pb to aid machining.

Adapted from *Copper-Base Casting Alloys* published by Federated Metals Division, American Smelting & Refining Co., New York.

PROPERTIES OF COPPER-BASE CASTING ALLOYS

Most commercial ingots contain varying amounts of other elements which are classified as impurities. They include Fe, Sb, S, Al, Si, P and Ni, and if held within specified limits they may be tolerated. Although most specifications limit Fe to smaller quantities, it may be present up to 0.3 per cent without harmful effect on mechanical properties. Above that amount the alloy becomes harder and more brittle, and a decrease in impact strength may occur. Hard spots also may result.

Antimony may be tolerated up to specification limits without harmful effects on mechanical properties but beyond those limits it causes progressive loss in strength and ductility, and general weakening of the alloy. Small quantities of S have little effect on mechanical properties. Sulphur decreases fluidity and tends toward excessive dross which may result in dirty castings. Consequently, it should be limited to preferably under 0.08 per cent.

Aluminum and silicon form oxide films which usually are trapped at the grain boundaries, and result in lowering the mechanical properties. Those inclusions also cause machining difficulties and leaky castings. Too much P may increase the fluidity of the alloy sufficiently to result in cutting into the sand. Using P as a deoxidizer a residual of 0.02 per cent in the alloy is sufficient. Nickel, formerly considered an impurity has proved to be beneficial since it adds some strength, promotes grain refinement, and tends to reduce segregation. Many specifications now include Ni as desirable, and it is usually permitted up to 1 per cent which is sufficient for desired results.

An oxidizing flame always should be employed, and fluxes are not necessary. Metal is superheated slightly to permit any oxides formed to rise to the surface and be skimmed off. To minimize gas absorption P should be absent from the charge, and if more than 0.01 or 0.02 per cent is present it should be neutralized by an appropriate amount of copper oxide. Metal should be skimmed cleanly and then enough P should be added to leave about 0.02 per cent in the alloy.

Alloys in this group have a wide variety of uses. In some the cost of the alloy may be important while in others special characteristics may be advantageous. In general the lower tin content alloys are lower in price while higher strengths are available in the 8 to 10 per cent tin containing alloys. Special applications are gear bronzes which mainly are copper-tin; bearing bronzes containing substantial quantities of lead, and bell metal, usually an alloy of 80 per cent Cu and 20 per cent Sn. Mechanical properties of this group vary considerably depending upon composition, and range from 30,000 to 50,000 psi tensile strength, 10,000 to 25,000 psi yield strength, 15 to 50 per cent elongation, and 40 to 100 brinnel hardness number.

Yellow brasses are characterized mainly by their relative cheapness and golden yellow color, and are essentially Cu-Zn alloys with small amounts of Sn and Pb. Possessing moderate strengths they are used largely in castings without rigid engineering requirements such as ornamental work, plumbing goods, flanges and small machine parts. Properties range from 25,000 to 45,000 psi tensile strength, 9000 to 20,000 psi yield strength, 15 to 45 per cent elongation, and 40 to 50 brinnell hardness number.

Mechanical properties depend largely on the amount of Zn which may vary from 15 to 38 per cent, and in general the higher the Zn, the higher the strength. Tin which usually is present up to 2 per cent adds slightly to the strength, and considerably to the hardness. Machinability and corrosion resistance of the alloys are improved by Sn. Lead is added principally to improve machinability. In addition to major alloying elements there also may be others usually classified as impurities. Iron can be tolerated up to 0.5 per cent or more providing it is not in the free state, and it produces grain refinement with slight increase in strength. It increases hardness, and castings to be machined on high-speed automatic machines preferably should contain under 0.25 per cent Fe.

Aluminum usually is absent from ingot unless specified. It increases strength and hardness, and greatly adds to fluidity. It often is added to castings with thin sections or sharp detail, and 2 oz per 100 lb are sufficient to produce the required fluidity. Aluminum also is used to overcome smoking and fuming since it forms an oxide skin or coating due to its high affinity for oxygen. Sulphur sometimes is present but in quantities which are not harmful, probably due to the formation of insoluble ZnS which is removed with the dross. Antimony may be present but should be limited to 0.1 per cent due to its tendency to increase hot shortness. Nickel may be present in any reasonable quantity.

Melting practice is similar to that for tin bronzes, and while there usually is little difficulty from gas absorption, furnace atmosphere should be oxidizing. Metal should be heated about 100° F above the pouring temperature to permit oxides to rise to the surface, and when removed from the furnace the metal should be skimmed carefully and allowed to stand until the desired temperature is reached. Hydrogen absorption usually is at a minimum because the large quantity of zinc vapor continually sweeps it away from the furnace atmosphere. Under reducing conditions and in the presence of carbonaceous materials carbon absorption is possible, and will cause porosity in castings.

Yellow brass has a high solidification and solid shrinkage, and gates and runners should be somewhat larger than for tin bronzes. Risers should be large to provide ample feeding, and gating arranged so that the alloy enters the mold cavity without agitation to avoid dirty castings. Strainer cores and choke gates should be used.

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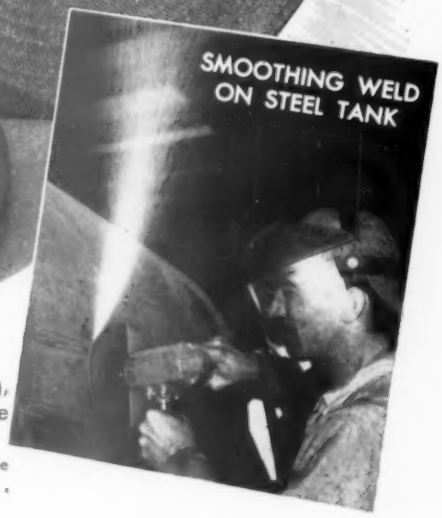

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THE FOUNDRY DATA SHEET APRIL, 1950

Man-to-Man

ON THE MOLDER'S BENCH

By RALPH L. LEE

"The Foundrilurgical Engineer"

IN my humble opinion Dr. C. F. Kettering of General Motors—or Boss Ket as anyone who has met him is sure to call him—has probably done more than any other man alive to sell hard-headed business men on research as a highly profitable investment. To those who are a bit hazy as to just what research really is, he usually tries to straighten them out by saying that, in his dictionary, "research means, finding out what we are going to do when we can't keep on doing what we are now." He always adds that we had better be interested in this future, for we are all going to be in it pretty darned quick.

Ever since I started out to earn my own living I have worked in the shadow of this great and inspiring man. Even before that I was brought up by a Dad who was one of his early associates back in Dayton. at the National Cash Register Co. Being mechanically inclined, there is little wonder that it's been just as natural for me to try to figure out better ways of doing things, wonder whether this or that would work, and why this and that is as natural as it is for a duck to swim.

This is the reason, I guess, that whenever you meet me you will find me all hopped up on one of my latest brainstorms or some new Goldberg I have made. The Lee Hobby foundry is no doubt proof of this irresistible urge of mine.

Well anyway, sometime ago I took a small working model of a molding gadget I have rigged up over to the foundry of a friend of mine for a try-out. He's one of those fellows who always has his nose to the wind and his ear to the ground for any new wrinkle. After the usual slaps on the back and a few "You old so and so's" he said, "where is that ding-bat of yours? What are we waiting for? Let's get going." So out into the foundry we went looking for a bench to work on. After several false leads we finally settled on one. Then in very short order Freddy had everybody and their uncle running all over the place gathering together the things we needed. While I had brought a bunch of stuff with me, it just seemed for a while that every time I started out to make a move something was missing that somebody had to take off and get.

When we finally did get going we really had one swell time, and for some reason or other my brain-child behaved like a little gentleman from the very start, although we certainly did play hob with production. Before I left I asked Freddy whether he'd ever considered roping off a little spot for tinkering, for trying out this and that. He said he'd had it in mind for a long time and that one of these days he was going to get at it; in fact, he told me in detail how he was going to equip it and fix it up.

Ever since that visit I've had my eyes peeled for some such setup, but I'm sorry to say I haven't found even one in all of the foundries I have visited. I asked my host and guide while going through one of the largest foundries of its kind in the country where their foundry experimental or research setup was, and he too said that they had it in mind and would get around to it some day.

I imagine, of course, that experimental work is going on in many of these places but hidden away or messed up with regular production.

Now I may be an amateur foundryman—in fact, I know I am—but doggone it I am not an amateur tinkerer or researcher. I know from actual experience that if, to try out some promising idea, we literally have to throw a monkey wrench in the bread and butter production, we're darned well going to shelve that idea till we can get around to it and keep right on doing what we're doing now till something pops. That's just human nature.

I don't think there can be any question that research is here to stay and has proved itself as a sound business investment beyond all question of doubt and by every measure. The only thing is that the word "research" usually makes a person think of a whole flock of high-browed geniuses in smocks slowly moving around in and out of a whole forest of high-falutin, high-priced apparatus or sitting on their fannies figuring out five, six and seven digit budgets for the coming year.

While there's no question you can't even touch some long-haul research projects with anything less than budgets like those that would feel at home in Washington, almost any foundry I've seen is literally loaded with opportunities for handsome returns on even the most piddling research and experimental investments.

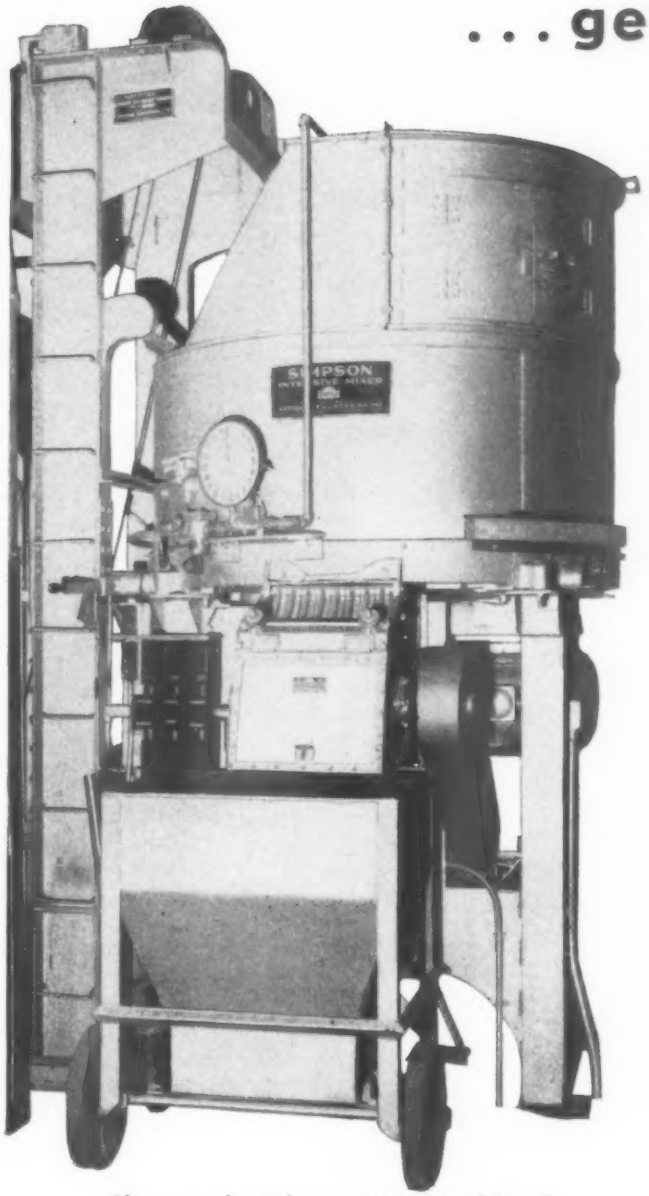
Here I go again sticking my long neck out, but I feel just as sure as I live that every foundry, even the smallest, really can't afford to carry on safely without someone spending his time, as Boss Ket puts it, trying to figure out what we are going to do when we can't keep on doing what we're doing now.

In my mind's eye I see a little section in every foundry all fenced off from bread-and-butter production, with a curious, fanatical foundry nut—something on the order of me, only much younger—free and equipped to try the screwiest things, including those that everybody says can't be done. I see this cookie working in a little nook that looks very much like the inside of the Lee Hobby Foundry—which, by the way, is entirely

(*Concluded on page* 140)

Before you buy ANY Mixer...

...get the answers to these QUESTIONS:



- What is the *actual* batch size in *pounds* that the mixer will handle on a daily production basis without overloading?
- How many tons of *properly prepared* sand will the mixer produce per hour, per day?
- How much horsepower is required *per ton of properly prepared* sand?

UNDER today's conditions, the answers to these important questions are more vital to *efficient* and *profitable* foundry operation than ever before. When you use SIMPSON Intensive Mixers, you'll find that the answers are on the *plus* side . . . with more productive capacity, lower initial cost, and less operating cost . . . based on actual operating data secured on the job in hundreds of foundries all over the country.

Shown at the right are actual capacities of some Simpson Mixer models. For more complete data, ask to have a National Engineer present additional facts and figures. Call or write today.

POUNDS PER HOUR OF PROPERLY PREPARED SAND WITH SIMPSON INTENSIVE MIXERS

SIMPSON MIXER MODEL	MAX. HORSE-POWER	BATCH SIZE IN POUNDS	2 MINUTE CYCLE	3 MINUTE CYCLE
No. 2	20	1,500	45,000	30,000
No. 3	50	3,000	90,000	60,000

Complete details on capacities of other Simpson Mixer models will be furnished on request

SIMPSON Intensive MIXERS

NATIONAL *Engineering Company*

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(*Concluded from page* 135)
equipped with home made stuff out of odds and ends and out of my all too small spending money.

I see the boys all over the foundry running to this dude with some idea they couldn't try without gumming up production. This fellow is like a sponge, he reads every thing he can get hold of on anything and everything, even remotely connected with the foundry. I also see somewhere in the background a boss who keeps him from straying too far afield, a boss who understands the peculiarities and temperament of these naturally inclined creative nuts and who is sold up to the hilt on the danger of not having forward looking research.

Of course, the fly in the ointment is — where in heaven's name are we going to find such an individual? In all probability he is working right now out in the shop in disguise. He may be in the neighborhood, or may-be one of the boys out on production could tip us off. As a last resort we may have to go to the schools and catch one young so we can bend the twig.

But I am sure that if we once make up our minds that it is hardly decent to run a foundry in this new day and age without research in keeping with the pocketbook, regarding it as a *must* equal in importance to bookkeeping purchasing, production, supervision, inspection and selling, we'll find the candidate for the job.

With the research job to do maybe some day there'll be a sheepskin for unadulterated, full-fledged Foundrylurgical Engineers who have decided to spend their lives and earn their spurs in engineering answers to our foundry problems and who wouldn't touch a job of manager, superintendent or what have you—even if it was offered then on a silver platter.

Iron Specifications Are Revised

Gray Iron Founders' Society, 210 National City—East Sixth Bldg., Cleveland 14, recently distributed to members and leading engineering schools and colleges, copies of a revised "Summary of Gray Iron Specifications" originally issued two years ago.

The bulletin contains a resume of the provisions of 14 separate sets of gray iron specifications including a change of designation in ASTM A-159-47 to ASTM A-159-49T and the addition of two new specifications covering new automotive irons 113 and 114.

Single copies of the summary are available free from the society.

Union City Mold & Die Castings Co., Union City, Ind., has added a new pattern shop building, new office building and laboratory to its plant.

MARKET ANALYSIS

(*Continued from page* 77)
sing activities. This work is more intangible in nature; hence, it has not been developed generally to the same high degree as has the preparatory work essential to product development.

Market analysis can prove especially valuable to foundries as a tool to step up sales, when two basic factors affecting marketing operations are remembered. First, the average foundry's sales radius is quite restricted, being approximately from 225 to 250 miles. Secondly, most foundries face stiffening competition from other products or processes, such as weldments, stampings and forgings.

A market study essentially is a fact-finding method that tells you where you are going. Vital facts are secured concerning the product, the customer, his wants, sales potentialities and so on that will help management to render decisions more intelligently. From this data may be formulated a merchandising plan designed to permit the company to sell its products most effectively and economically. The facts obtained provide a sound basis for making a decision on the following:

1. Desirable improvements in product.
2. Correct selling price.
3. Undesirable points of the product might be a deciding factor.
4. Kind and location of consumer.
5. Present and potential volumes.
6. Consumers' buying habits.
   (a) How much of product is purchased at one time.
   (b) How often does regular user purchase product.
   (c) Where does consumer buy product.
   (d) How is product purchased.
7. Customers' likes and dislikes.
   (a) How do changing likes of consumers affect sale of product.
   (b) Why do present consumers buy product.
   (c) Why nonusers do not buy product.
   (d) Why did former users discontinue buying.
8. Right sales promotion plan.
   (a) To indicate advertising media and methods which will reach present and potential users of product.
   (b) To co-ordinate advertising with sales.
9. Number of units of product that may be sold over a given period.
10. Method of selecting salesmen.
11. Selling methods.
12. Salesmen's routes or territories.
13. Salesmen's compensation plan.
14. Best channels of distribution.

Market Study Requirements — A market study involves (1) accumulation and analysis of historical and statistical data, and (2) field investigation covering actual contacts with customers and prospective customers in different sections of the market. The first phase, done largely from records, usually includes:

1. Tabulation of sales by products over a period years to determine any increasing or decreasing trend.

2. Accumulation of sales by products for the industry as a whole for a similar number of years to determine whether the company is retaining its position in the industry.

3. Tabulation of sales by customers for a period of years and classification by size of account, to determine whether there is any large turnover in customers, whether a few customers provide largest proportion of the business, or whether volume is uniformly obtained from all customers.

4. Determination of sales made by individual salesmen for a period of years, which should be compared to the salesmen's salaries, commission, and traveling expenses to determine whether satisfactory earnings have been made by salesmen; and whether their expense has been in proper relation to their sales.

5. Determination of total number of customers and compilation by states, counties, trading areas, towns or cities, or industry classification.

6. Analysis of salesmen's calls and territory to determine type of customer upon whom he calls and amount of time devoted to these calls.

7. Review of entire office selling procedure to become familiar with the handling of orders, degree to which delivery promises are kept, manner of billing and credit policies.

8. Analysis of method by which new salesmen are selected and trained;

(*Continued on page* 142)

FOR ENDURANCE AND LONG LIFE BUY SPO MOLDING MACHINES

Cut the Production Cost OF YOUR DRAG MOLDS . .

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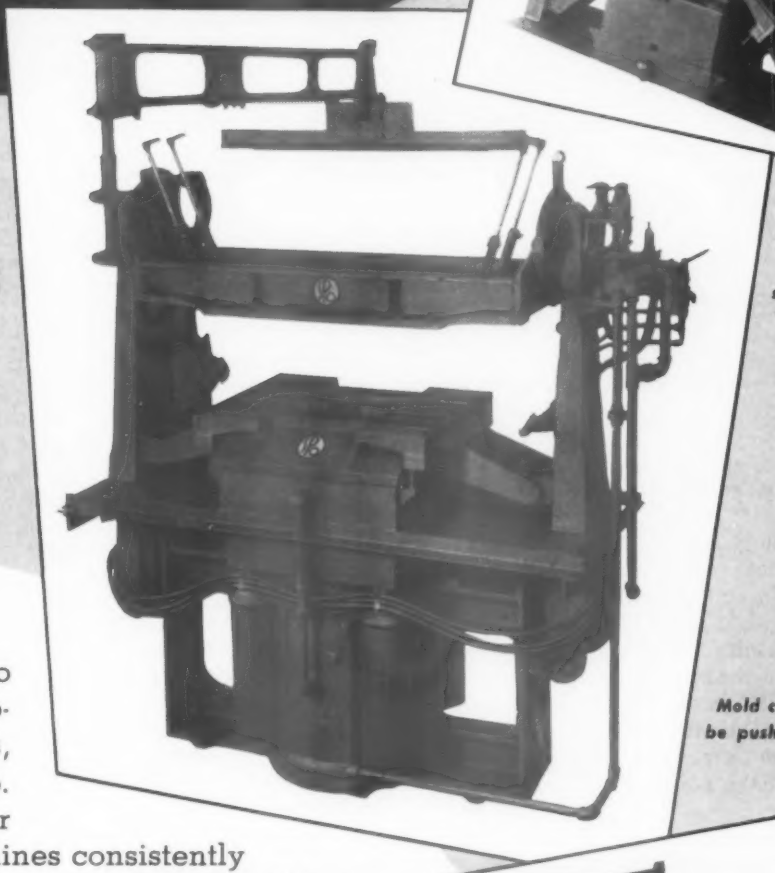
SPO

No. 900 SERIES Jolt Roll-over Squeeze Draw Machine

BOOTH 1306

SPO No. 900 in position ready to start jolt operation.



Mold completed, ready to be pushed onto conveyor.

If you are anxious to cut your costs on producing drag molds, consider the SPO No. 900 Series. Wherever installed, these machines consistently effect marked savings. Largely responsible are very rugged design and extreme simplicity. For more molds per man hour and more accurate molds, rely upon the SPO No. 900 Series Jolt Roll-over Squeeze Draw Molding Machine. Available in three sizes: 14", 17" and 20" squeeze piston.

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(*Continued from page* 140)
manner in which they are assisted in the field by company officers.

9. Analysis of each expense account in selling expense classification to determine its necessity and also to build up proper relation between total selling expense and sales volume.

Following statistical preparation comes field investigation, which provides for field contacts carefully organized to secure contact with a representative cross section of the actual market. Contacts are made with both good and poor territories, large and small customers good and poor salesmen, and representatives of each type of outlet. If the number of contacts selected in each group has the same relation to the total contacts made, as each group has to the total field, a true sampling of the total field is thus secured.

Before going into the field, a questionnaire usually is prepared, listing the specific points of information required. Points developed from the statistical analysis that appear to require corrections are stressed. For example, if the statistical data indicate that the company is constantly losing a certain portion of its customers, particular emphasis must be given to questions that will bring forth the reasons.

In some cases, it is possible to use a questionnaire that can be sent through the mail; in others, it will be found necessary to make all contacts personally. Frequently, a combination of the two methods is possible.

Personal contacts should only be made by a skilled investigator—one who knows from experience and training how to make a proper contact that will yield the maximum, most dependable information. An unskilled investigator may receive replies to his questions that may have been sincerely expressed by the person being interviewed, but which may be incomplete or true for only a certain set of conditions. The skilled investigator recognizes such difficulty and endeavors to obtain a complete answer.

After contacts in the various sections of the market are completed, all findings are tabulated. From the data accumulated, a merchandising program may be prepared outlining in detail changes needed in the present methods, new procedures that should be adopted, sales volume that should be realized and which can be co-ordinated with manufacturing facilities and available finances, and the manner with which that volume is obtained with reference to territories, salesmen and products.

Obviously, the job of making a market analysis can become quite involved, especially where the enterprise and its products are in a highly competitive field. Household appliances, for example, entail an elaborate distribution setup encompassing company branches, distributors, jobbers and retailers. A multitude of facts must be ascertained. In contrast, the average foundry's merchandising job resolves itself basically into determining the customers' wants accurately, then producing castings with the special properties which meet these requirements. Intensive selling furnishes the link between demand and production.

One investigation recently completed for a midwestern gray iron foundry of medium size illustrates the value of market analysis to foundries. Here, the objective was to secure facts concerning market conditions that would assist management in making decisions; and from which a merchandising plan could subsequently be developed to improve the company's competitive position and to obtain a volume of sales capable of yielding a satisfactory profit margin. Conclusions and recommendations were based upon information obtained from company executives and from personal interviews with customers—past, present, potential—and with several competitors in some 16 communities within a 250-mile radius. Sales methods of these concerns, along with those utilized by others manufacturing products of similar character, also were reviewed.

Make It Better With Gray Iron
THE DECATUR CASTING CO.
GOOD WAGES
PROGRESSIVE MANAGEMENT
OPPORTUNITY
WITHOUT A LOST TIME ACCIDENT TO JAN. 30, 1950

WINDOW DISPLAY: Decatur Casting Co., Decatur, Ind., exhibited this display in the Decatur Chamber of Commerce window for three weeks during the latter part of January and early February. The display featured products of the company and its no-lost-time accident record which extends back to Aug. 2, 1948

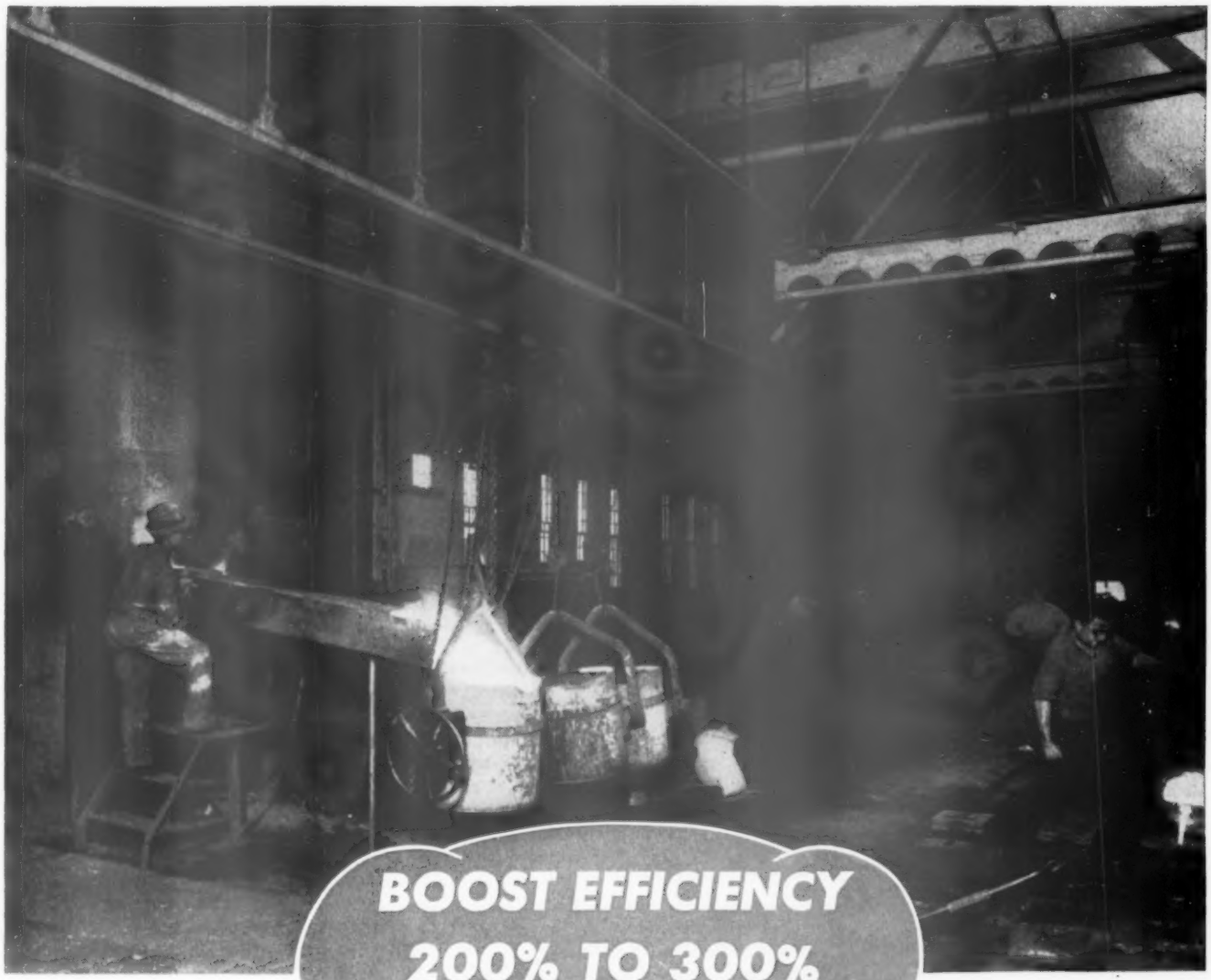
Meet Sharp Competition

A semiproduction shop with a daily capacity of 60-70 tons of castings up to 100 lb, this foundry formerly produced two kinds of gray iron castings —one a soft, high-silicon iron of relatively good machinablity, the other a low-silicon composition of higher tensile strength. They were used as components of automotive and electrical equipment, machine tools, farm machinery, and hardware. During and since the war, however, the company produced only the low-silicon, harder iron. Of good quality and suitable for many applications, it still proved harder then necessary from the machining standpoint.

With production channeled to only one type iron, this foundry soon found its customers dwindled with lessening diversification of output. However, unusually large requirements of two plants took a considerable portion of the foundry's capacity. But when reduced purchases due to production cutbacks and high inventories, this foundry had to cut its output drastically. When the study was undertaken, this foundry was operating at approximately 25 per cent capacity and had shown a loss for several months previously.

Findings indicated many factors favorable to profitable sales expansion — an excellent reputation among customers, both present and past, for dependable product quality and prompt customer service: price quotations generally in line with those of competitors for the same kind of iron, and a comparable reputation among competitive foundries regarding fair and ethical practice in competitive bidding. While the castings being produced by the company were of good qual-

(*Concluded on page* 144)



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CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

(*Concluded from page 142*)

ity and high tensile strength, they were found to be too hard for high-speed machining, particularly on thin sections. Greatest percentage of demand was for castings readily machinable at high speeds. Cases where tensile strength was considered a major purchasing consideration proved very few.

Evidence accumulated also indicated that despite slowing down of business in recent months and intensifying competition, there definitely exists a potential substantial volume for foundries within the area equipped for good quality and service and which tackle the problem of sales aggressively. In this particular case, it was further found that sales promotion had been practically nil, that sales efforts had been confined chiefly to servicing present customers and to following up inquiries, and that the company had no suitable literature to put into the prospective purchaser's hands, or included with mailed quotations. On the basis of these and related facts, the following recommendations, among others, were made to this foundry:

1. Adopt the policy of producing two irons to meet the high ratio of demand for readily machinable castings.

2. Advise present, past and prospective customers of this decision accordingly.

3. Investigate the capital investment required to produce castings up to 400 lb, with the objective of producing larger size castings as step number two in obtaining additional volume necessary to utilize available productive capacity of the foundry to the maximum and to maintain product diversity.

4. Map out definite program for canvassing and soliciting orders within a 250-mile radius.

5. Record information on each sales call as made, collating this data in the office to build up a list of users of present or possible future products.

6. Concentrate and continue sales effort, using free time of executives in this work until volume builds up sufficiently, when another trained sales representative can be employed.

7. Prepare suitable advertising literature covering the company's products, experience, reputation, equipment, service, etc.

8. Completely review estimating procedures, so that the internal organization can process quotations in quantity.

9. Study existing standards and rates with the objective of being able to establish cost estimates on a per piece basis.

Quality and Service Paramount—Considerable comment is heard currently about deep-cut prices. Competitive foundries from certain nearby states were found in this instance quoting prices as low as 6 and 7 cents per pound. Yet the most interesting fact uncovered was that buyers, in most cases, were showing little interest in these low prices. However, purchasers frequently were using such quotations as a threat to get lower prices from present suppliers.

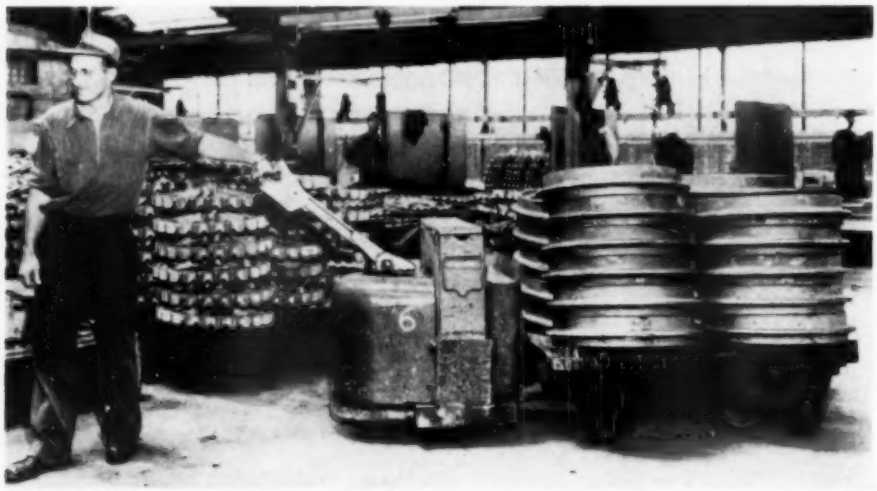
Equally significant, most users of castings proved far more interested in such considerations as a dependable source of supply, products of uniformly good quality, and the provision of prompt service on small quantity orders. So it is easily conceivable how this company, by living up to its present excellent reputation and by stressing these factors in its sales approach, can do much to thwart the low prices quoted and increase its volume.

Having adopted the recommendations made on the basis of the findings of this market study and now in the process of carrying them out, this foundry launched a sound merchandising plan designed to improve the company's competitive position and to expand its sales volume profitably. Operations have now reached 70 per cent of maximum capacity. The loss curve of recent months has been checked and although full weekly schedules are still not being worked, sales have materially increased and there is definite evidence that the marketing road map does point the way to profits.

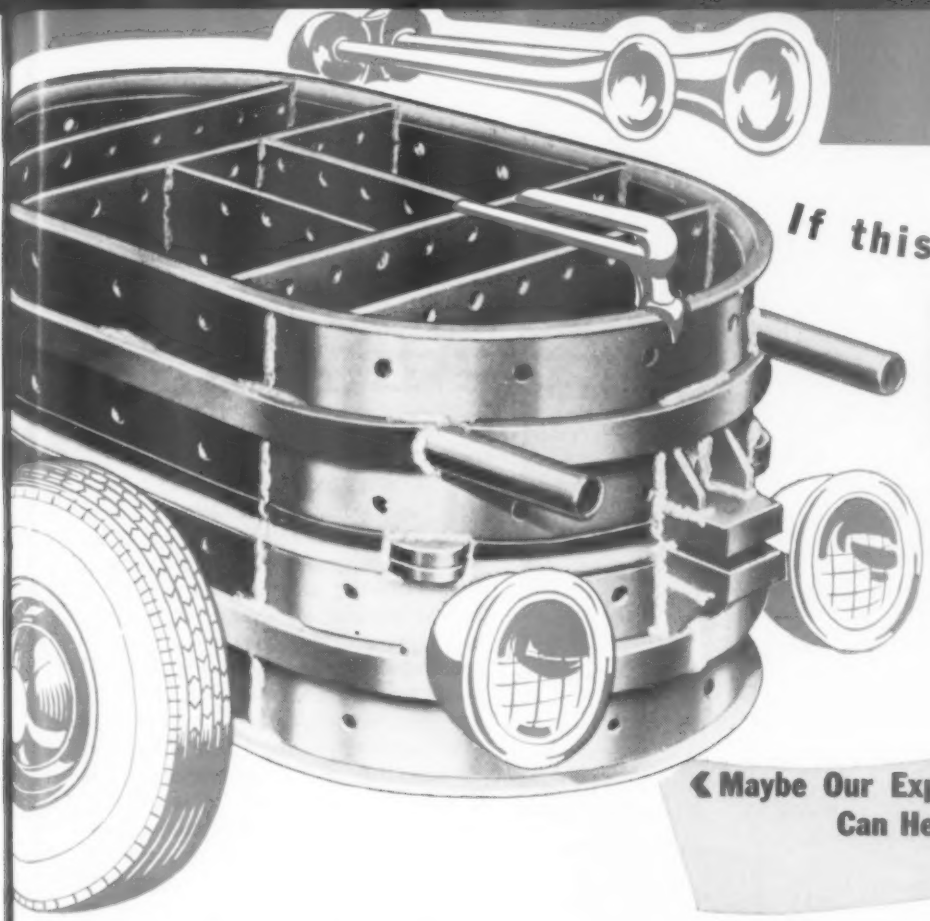
Effective Merchandising Needed—Currently curtailed production, plus competition within and without the industry, make effective merchandising "the order of the day" for many foundries—and that is where a market study enters the foundry operating picture. Once you have found out what your customers want or need, what your logical marketing area is, and what new or different steps appear necessary to make certain that you are in a solid position to meet these needs adequately, you are on the road to greater sales volume. Such basic facts are best determined through a market survey conducted by management engineering consultants qualified and equipped to do the job with strict objectivity and exacting thoroughness.

When called in to review the sales picture, the consulting management engineer does not take anything for granted simply because "that is the way it has been done for years." Having an outside point of view, he questions everything with an independent perspective, based on his wide experience and broad knowledge gained through dealing with similar problems in other industries. His report and recommendations, therefore, reflect these factors in pointing up the things that should be done.

Market analysis marks the first step in finding the right answers to selling problems. Foundry executives who shift the emphasis in their thinking from production to merchandising, then follow through with the application of the basic principles of sound salesmanship, may well find the outlook on future operations a most encouraging one.



MATERIALS HANDLING: One-man-operated electric lift trucks, such as the one shown here carrying 22 idler wheels weighing approximately 150 lb each, are said to increase the volume of castings that can be handled by one man in a day and to reduce fatigue by eliminating lifting, tugging and straining. In one large steel foundry, using these trucks, one man handles as large a castings volume as two men did with hand lift trucks. Photograph was furnished through the courtesy of the Barrett-Cravens Co., Chicago



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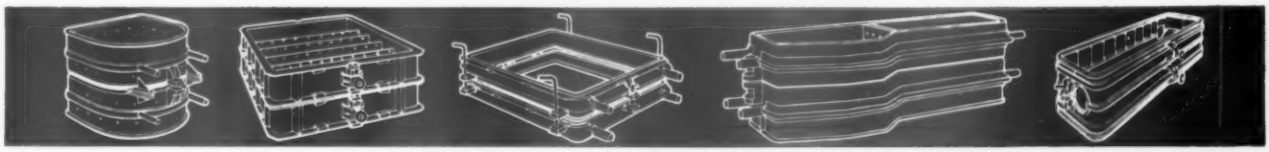

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Machine M

LARGED

RECENTLY installed and now in operation at the Trafford Foundry Division of the Westinghouse Electric Corp. at Trafford, Pa., is what is believed to be a unique method of making large dry sand cores. For several years the foundry had been trying to acquire a coremaking machine with the right sequence of operations for making this type of core. There being no coremaking machines available with a squeeze before rollover, it was decided to try a regular molding machine. The machine selected was the jolt-squeeze rollover draw machine.

Cores ranging in weight from 50 to 350 pounds, and which had formerly been made as bench and floor jobs, are now being made with this equipment. Although this type of machine is now being used in several installations for specialized green sand core production, it was originally designed as a high-speed draw molding unit and has not previously been used for dry sand molding of cores. As used at the Trafford Foundry Division, the machine is a standard molding unit with no specially engineered changes or extra equipment.

Since the installation of this equipment, Trafford Foundry has been able to reduce core costs on those jobs where the activity was not large enough to justify the expense of blow boxes. It has been possible to take boxes that previously had been hand-rammed and place them on this machine with few changes. Along with a decrease in costs, an improvement in core quality and uniformity was effected. No rapping is necessary to draw, and therefore adjustments are easier to make and a much more solid uniform core is obtained. Also, the life of the corebox is lengthened con-

Fig. 1 (top) — Spaces between individual boxes of this multiple corebox are filled in to give a continuous surface

Fig. 2 (bottom)—Having brought the squeeze car into position, the operator prepares to initiate the squeeze stroke

By M. J. KELLNER
Superintendent
Trafford Foundry
Westinghouse Electric Corp.
Trafford, Pa.

Molding DRY SAND CORES

siderably over that obtained before.

The machine used has a 9-in.-diam jolt piston with a recommended jolt capacity of 1200 pounds and a 21-in.-diameter squeeze piston which produces a net squeeze force of 24,000 lb at 80 psi line pressure. The draw stroke in this particular machine is 12 in. and, as rated for molding usage, the maximum flask dimension is 41 x 35 x 18 in. For coreboxes a maximum of 44 x 38 x 18 has been obtained.

Full capacity of the machine is utilized by mounting as many as five coreboxes at a time on the pattern or corebox cradle. However, this is done only with smaller sizes of cores, while the largest cores are made one at a time. Fig. 1 shows a typical multiple corebox arrangement with four boxes of varying height being mounted on a common board. Both wood and metal boxes are in use, but it has been necessary to reinforce most wooden boxes and some metal boxes to withstand the exerted squeeze pressure—in some cases about 35 psi.

As shown in Fig. 1, the spaces between individual boxes, in the case of multiple mounting, are filled in to give a continuous surface. This has been done to prevent excessive sand spillage between the boxes, to assist in placing the sand in the core cavities, to insure a good contact of the core plate, and to act as a bearing surface for the manual strike-off operation. In the following discussion it will be assumed, for purposes of simplicity, that a single corebox is being made. The operations for a multiple mounting are essentially the same.

With the corebox firmly mounted on the machine cradle, core sand is delivered to the box from an overhead hopper located in a position over the center of the cradle as shown in Fig. 2. After partially filling the box with sand, the operator positions any reinforcing rods and lifting hooks which may be required by the particular core being made. Enough sand is then again hoppered to the box to leave an excess over the box after jolting, this excess sand being re-

Fig. 3—The box has been rolled over and the draw stroke completed, with the finished cores resting on hte core plate and eradу to be removed on the conveyor in the foreground

Fig. 4—Some typical cores, indicating the types and sizes that can be made with the equipment

quired for the squeeze operation. The box is then jolted a minimum number of jolts, after which the squeeze car is brought pneumatically into squeeze position. The sand is then squeezed, with the excess over the box contacting a Micarta squeeze board mounted on the squeeze car. This smooth Micarta board prevents sand being pulled away from the core after the squeeze.

Loose pieces and ram-up chills are hand tucked by the operator prior to jolting and squeezing.

Following the squeeze stroke, excess sand is struck off and the required vents are cut in by the operator, who also exposes any lifting hooks required by cutting away the sand around them. The core plate is then positioned by the operator and pneumatically clamped. The box is rolled over, leveled, and unclamped. The box is then drawn from the core, using a slow draw along with vibration until the box is broken away from the core. When this breakaway has been effected, the draw action is rapid.

With the draw stroke completed, the finished core rests on the core plate in a position in front of the operator, who then removes any loose pieces from the core. The plate carrying the core is pushed out through the machine to a conveyor (Fig. 3) which is tied into a built-in kick-out conveyor on the machine and upon which the plate rests following the draw operation. The plate and core are then transferred to a rack by means of a hoist. When the rack is full it is transported to the core ovens.

The operator then rolls back the machine cradle and returns it to its original jolt position. Following cleaning by means of an air hose, the corebox is ready for the next cycle.

The molding machine used in this operation was furnished by the Milwaukee Foundry Equipment Division of SPO Inc., Milwaukee.

Book Review

Transformer Principles and Practice, second edition, by J. B. Gibbs, 232 pages, published by McGraw-Hill Book Co., New York. Price $3.50.

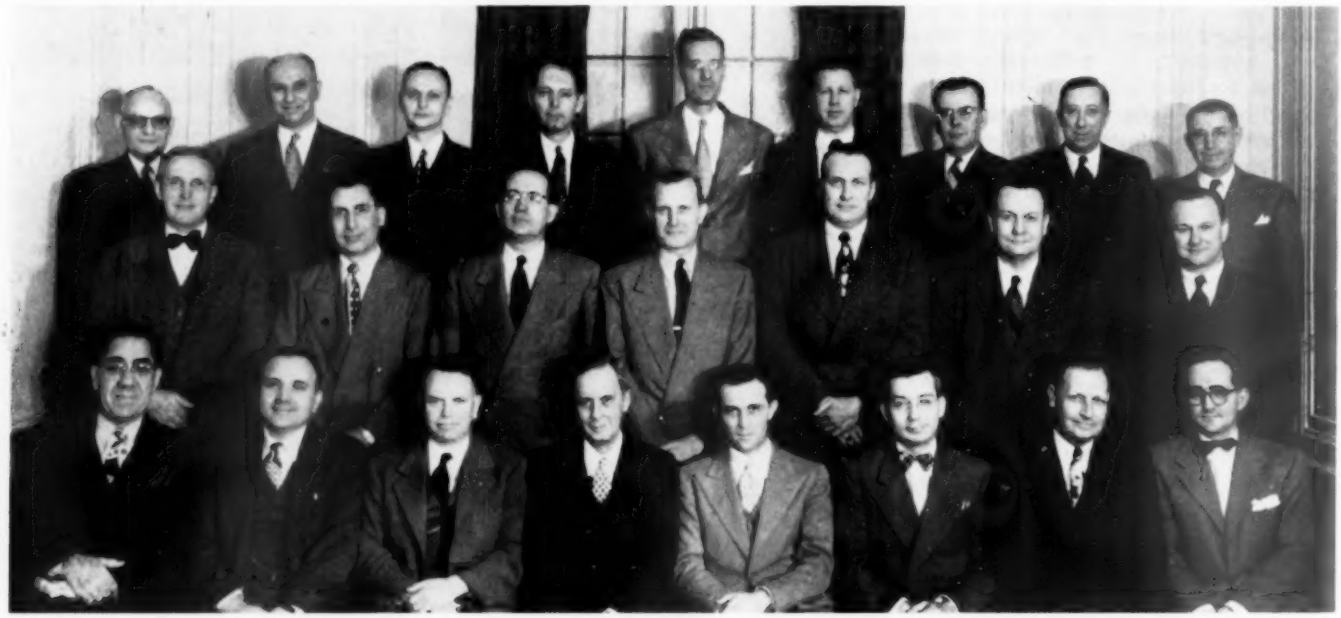
The book deals with all aspects of the construction and use of transformers, including underlying principles, applications, connection, testing, care, and economics. The first chapter discusses fundamentals of transformer performance and construction. Subsequent chapters describe many particular types of transformers, large and small, for various purposes. Transformer connections, phase transformation, polarity, ratio adjustment, mechanical forces and other subjects are dealt with in detail. The revised edition includes a new chapter on current-limiting reactors, plus many new illustrations.

Marburg Lecture Is Published

The 1949 American Society for Testing Materials Edgar Marburg Lecture, "Residual Stresses in Metals," by Dr. William Marsh Baldwin Jr., research professor and director, metals research laboratory, department of metallurgical engineering, Case Institute of Technology, Cleveland, has been published.

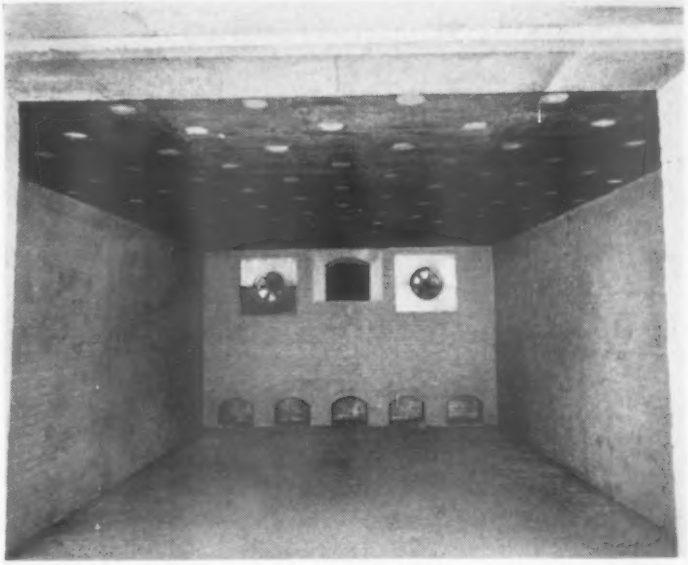
The lecture covers the fundamental differences in the mechanisms by which residual stresses are developed by cold working operations, by heat treatment, and by casting and welding. Experimental methods used to evaluate residual stresses, various residual stress patterns found in fabrication, effects of residual stresses, and methods for the elimination of residual stresses, also are discussed.

Copies of the 48-page illustrated booklet may be purchased from the society for $1.



FOUNDRY EDUCATION: Members of two of the Foundry Educational Foundation's committees—the Technical Advisory Committee and the University Advisory Committee—held a two-day conference in Cleveland, Feb. 16-17. Participants in a dinner meeting held during the conference included: *Top row*—G. H. Kann, Pittsburgh Crushed Steel Co.; S. C. Massari, AFS; Prof. C. T. Marek, Purdue; Prof. D. C. Williams, Ohio State; C. F. Walton, Case, Prof. R. H. Cole, Northwestern; Prof. P. E. Kyle, Cornell; E. G. Fahlman, Permold Co.; Prof. G. J. Barker, Wisconsin. *Second row*—J. H. Lansing, Malleable Founders' Society; Prof. C. C. Sigerfoos, Michigan Sate; C. O. Burgess, Gray Iron Founders' Society; W. G. Gude, *The Foundry*; L. D. Ryan, Malleable Founders' Society; J. E. Janney, Rohrer, Hibler & Replogle; G. K. Dreher, executive director, FEF. *Bottom row*—A. J. Tuscany, Foundry Equipment Manufacturers Association; C. W. Briggs, Steel Founders' Society; L. C. Price, Michigan State; Prof. E. C. Wright, Alabama; Prof. Warren Jeffery, Alabama; Prof. J. F. Kahles, Cincinnati; Prof.C. E. Bullinger, Penn State; Prof. H. F. Taylor, MIT

Improved Annealing Cycles Through A. P. GREEN *Engineered* REFRACTORY LININGS



Oil-fired annealing oven for malleable castings. The flat suspended arch is KAST-O-LITE and the sidewalls are G-23 Insulating Firebrick.

A. P. Green KAST-O-LITE insulating refractory castable was used throughout sidewalls and arch for this pulverized coal-fired oven.

Malleable operators report easier controlled annealing cycles through the use of the proper combination of A. P. Green refractories. Efficient furnace operation means lower production costs and better control of the physical properties of the castings. It can only be achieved by a refractory enclosure which contributes to the desired annealing cycle.

The two ovens illustrated are typical examples of A. P. Green engineered refractory linings. One is a complete monolithic lining of A. P. Green KAST-O-LITE, a light weight castable refractory. The other is a combination lining — KAST-O-LITE arch and G-23 Insulating Firebrick sidewalls. Both have excellent performance records effecting improved product quality at reduced fuel costs.

The A. P. Green Fire Brick Company Engineering Department will assist you with further information on the application of these materials to new units or the conversion of existing furnaces. Call your local A. P. Green distributor . . . he's listed in the yellow pages of your telephone directory . . . or write . . .

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A. P. GREEN REFRACTORY PRODUCTS — OUR 40th YEAR SERVING THE WORLD'S INDUSTRIES

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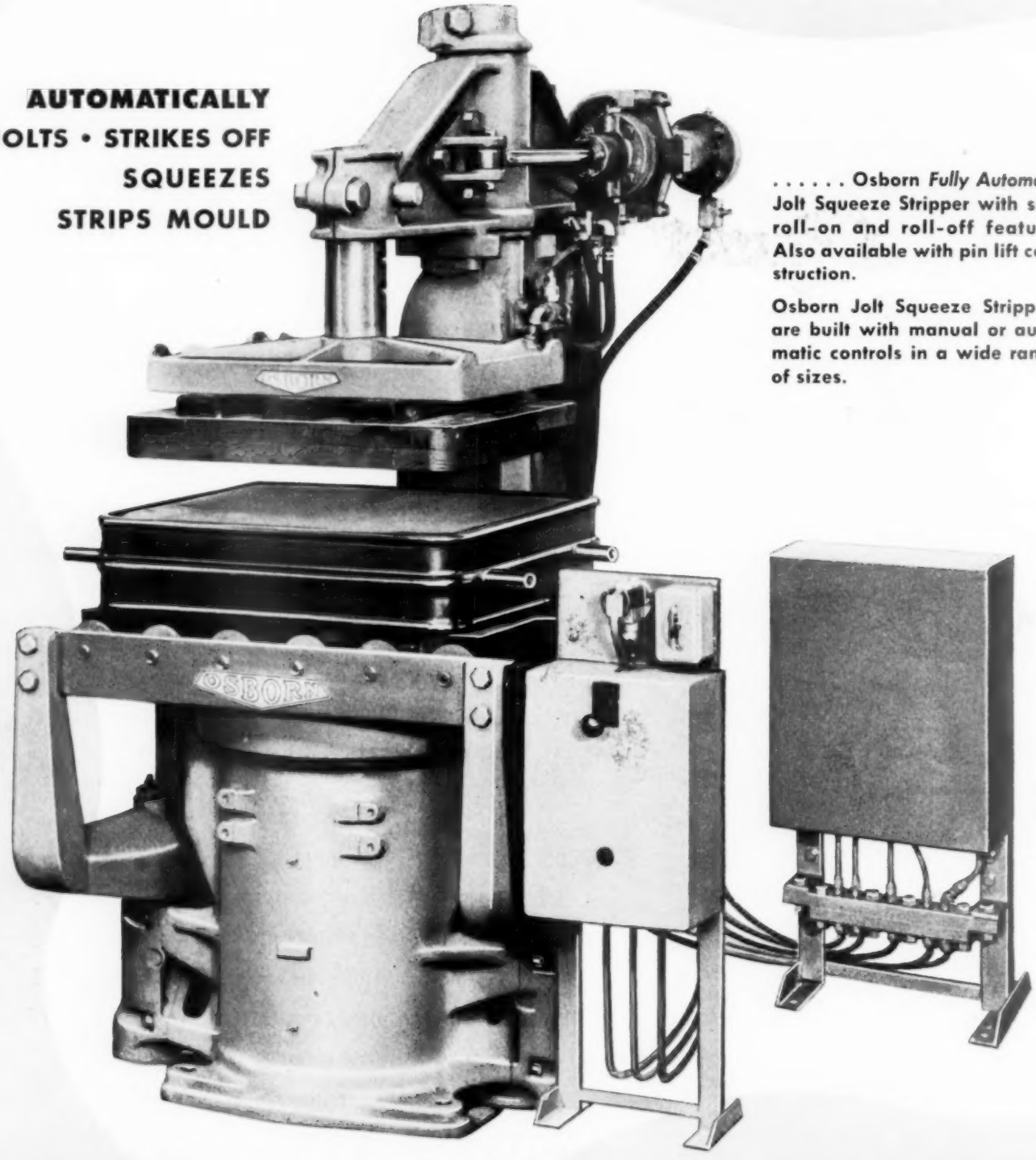
JOLTS • STRIKES OFF
SQUEEZES
STRIPS MOULD



. . . . . Osborn *Fully Automatic* Jolt Squeeze Stripper with side roll-on and roll-off feature. Also available with pin lift construction.

Osborn Jolt Squeeze Strippers are built with manual or automatic controls in a wide range of sizes.

ills Mou

THE OSBORN MANUFACTURING COMPANY
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Controlled Jolt Squeeze Strippers

• Simplifies Mould Production

Operator has only to fill the flask and start the cycle. Machine *automatically* jolts, strikes off, moves squeeze head into position, squeezes, moves squeeze head out of position and draws.

• Increases Output

The *pre-set* machine moulding time is accurately duplicated on each mould. During automatic cycle, operator is free to set cores and close moulds. The time cycle can be easily adjusted to suit a wide range of job requirements.

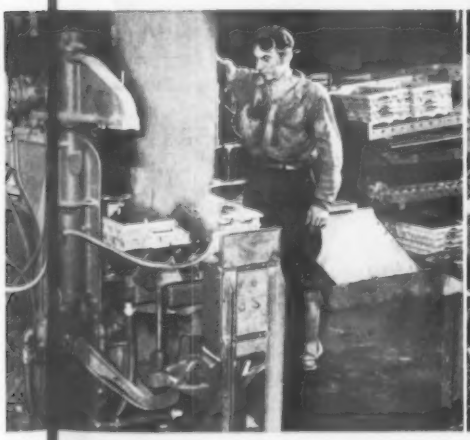
• Safe

Timer unit and controls are mounted on separate control panels which can be located at any position handy to the machine. No electrical controls are on the machine proper.

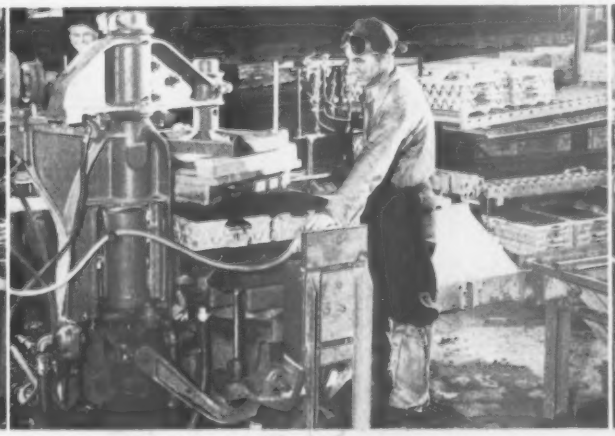
ANOTHER EXAMPLE OF OSBORN LEADERSHIP AND ADVANCED ENGINEERING

IN SERVICE FOR SEVERAL YEARS

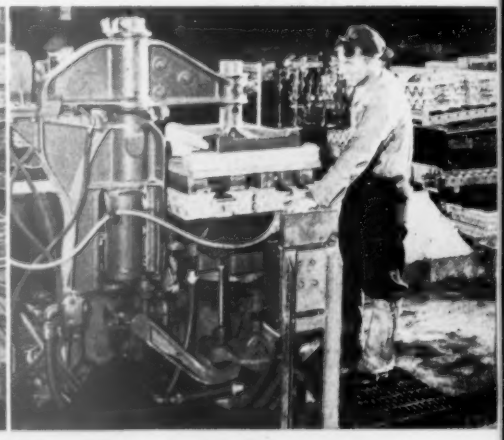
Below is one of many typical Osborn *job proven* installations. At one Westinghouse Electric Corporation foundry, Osborn automatically controlled Jolt Squeeze Strippers have helped to increase operating efficiency over 80% while substantially reducing physical fatigue, according to company officials.



lls Mould from Overhead Hopper



Starts Automatic Cycle



Squeezes Mould Automatically

OSBORN

MOULDING MACHINES

CORE BLOWING MACHINES

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

AROUND Detroit

Internal combustion engine industry is first to study subject of standardizing civilian products required by the armed services . . . Move is desirable but many problems involved

WHY haven't more civilian industries been called on by the armed services to standardize their products so as to permit maximum interchangeability of parts? This subject was a hot one during World War II when widely used civilian products had to be procured from all possible sources, with the result that a vast assortment of parts was needed for field maintenance and repair.

As an example, take the transportation situation on the small island of Kwajalein. After the United States took it from the Japs, three services established posts there—the Navy, the Army and the Marine Corps air arm. Each had its own fleet of motor vehicles, representing altogether the products of a number of manufacturers, so that the stock of spare parts was at least three times in extent and variety what would have been required had any one type of vehicle been adopted as standard for the island. This very same problem occurred in connection with countless other types of equipment. The job of logistics, therefore, was far more complicated and burdensome than would have been necessary under standardization.

When the Munitions Board tackled the matter of standardization after the war, it found that the job would prove a far more difficult one than had been expected originally. It quickly became apparent that two factors would prevent rapid progress toward the goal of maximum interchangeability of parts. First, standardization of items used in large numbers by both the military and civilians would have to be acceptable to all parties because of competitive considerations involved. Second, it would have to be based on the currently available tools and facilities in the producing industry concerned, for any program requiring extensive retooling would be excessively costly and would paralyze over a considerable period many of the plants in the industry, and thus sharply reduce the available capacity.

GIFT TO PURDUE: Perfect Circle Corp., Hagerstown, Ind., has given Purdue University, Lafayette, Ind., the jolt stripper molding machine shown in the illustration. The machine is designed to make piston rings in green sand stack molds. Grouped around the machine, left to right, are: Richard H. Bancroft, executive engineer, Perfect Circle Corp.; Prof. C. T. Marek, Purdue; Marvel Tarr, project engineer, Perfect Circle Corp.; Prof. R. W. Lindley, Purdue; L. D. Weast, Purdue; Prof. H. A. Bolz, Purdue, and Dallas F. Lunsford, plant manager, Perfect Circle Corp., New Castle, Ind., plant. The photograph was taken on the production line at the New Castle plant

In view of all these angles, the Munitions Board decided to select one industry as a guinea pig to see what could be done. This was the industry that manufactures internal combustion engines for marine, automotive and general industrial purposes. Many months were spent in going over the ground in a preliminary way. Finally in April, 1949 it created an Industry Advisory Committee for Internal Combustion Engines, with C. E. Nelson Jr., Waukesha Motor Co., Waukesha, Wis., as chairman. The story of what this hard-working committee has been able to accomplish in the intervening year emphasizes the size of the difficulty attending a project of this kind. The committee has gone only a small part of the way toward the goal of maximum interchangeability of parts.

Canvass the Industry

First major action of the committee is the filing of a recommendation that the Department of Defense canvass the entire industry to determine the extent to which engines having maximum interchangeability of fast-wearing parts may be produced on the industry's present major machine tools. After completing such a survey, the Department of Defense then would approach the industry on a program of actually producing engines incorporating maximum interchangeability of the fast-wearing parts. Along with this recommendation, the committee reported that its preliminary investigations have indicated that a considerable degree of interchangeability of fast-wearing parts may be feasible, but that big problems would be involved, since the bulk of the engines in any large procurement program would have to be obtained by buying engines in current production.

The committee reported that it recognizes the need to provide for the production of special-type engines to meet special needs, and recommended a policy under which the industry would co-operate to make these special-type engines adaptable to existing production facilities—so that they actually could be produced. The committee reported agreement that a high degree of standardization and simplification can be accomplished in accessory items—fuel pumps, spark plugs, electrical systems, bases, etc., but that this phase should not be tackled until the problem of interchangeability of parts has been whipped.

In view of the experience in connection with internal combustion engines, the Munitions Board is proceeding slowly in approaching other

(*Concluded on page* 154)

a mechanized foundry benefits everyone

● In the Foundry Industry, as in all others, the advantages of mechanization are far-reaching. The production of more and better castings, at less cost, which is made possible by modern foundry equipment, benefits the foundry employees, management, the shareholders or owners and the purchasers of the products on which the castings are used. It might be an automobile, a home appliance, an outboard motor, a farm implement or any one of a thousand products which are made better by the use of castings. The application of modern foundry equipment, and the efficiency and economy which it creates, is bringing more good things within the reach of more people.

Well-planned conveyer systems are usually pretty important in foundry mechanization programs. Today, Mathews Engineers are making available to American and Canadian Foundrymen the benefit of long experience with foundry conveying problems. This, and the facilities of three modern plants, is yours for the asking. Write or wire today for catalogs. Engineers in all principal cities.

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(*Concluded from page* 152)
civilian products for standardization to encourage maximum interchangeability of parts.

The standardization problem, incidentally, prevails only in connection with products whose principal normal use is by civilians and which are bought in large quantities by the military in time of war. The standardization problem does not apply to purely military items; these can be standardized to any degree desired.

CLEVELAND papers recently carried an illustration showing a crew taking soil samples at the site of the new foundry in suburban Brookpark. That village is reported to be experiencing quite a real estate boom. In Detroit it has been announced that Frank C. Riecks has been transferred temporarily to the Central Staff Office of Plant Engineering to enable him to help in the construction and installation of equipment in new plants.

Plans also have been announced for modernization of the Rouge production foundry, which will be expanded into space vacated by transfer of the casting machine plant. The production foundry is scheduled to continue its operations at peak output while the modernization program is underway. In addition, the steel foundry will be completely re-equipped and converted to the production of crankshafts and exhaust valves for use by new motor plants.

Foundry Saves Money With
Modern Space Heaters

FOR nearly half a century, the Pittsburgh plant of Rosedale Foundry & Machine Co. was heated by hand-fired coke-burning salamanders of the type shown below. The building is 452 ft long. The area used for foundry and machine shop work is 60 ft wide, and an additional 28-ft width is occupied by a two-story section integral with the main plant. The second floor of this section is heated separately.

Because of the uninsulated metal walls and 48½-ft-high ceiling it was believed the building could not be heated economically except by the 39 salamanders used in the foundry and machine shop. However, analysis showed that cost of salamander fuel and labor for its handling was $11,134 a year—plus the cost of various intangibles incident to that type of heating. By contrast, it also was found that four large-capacity, gas-fired space heaters would cost only $10,732 yearly to operate—$6762 for fuel plus 25 per cent amortization of the equipment and installation expense. After four years, when the heaters would be amortized, the annual cost would drop to $6762, a saving of $4372 each heating season.

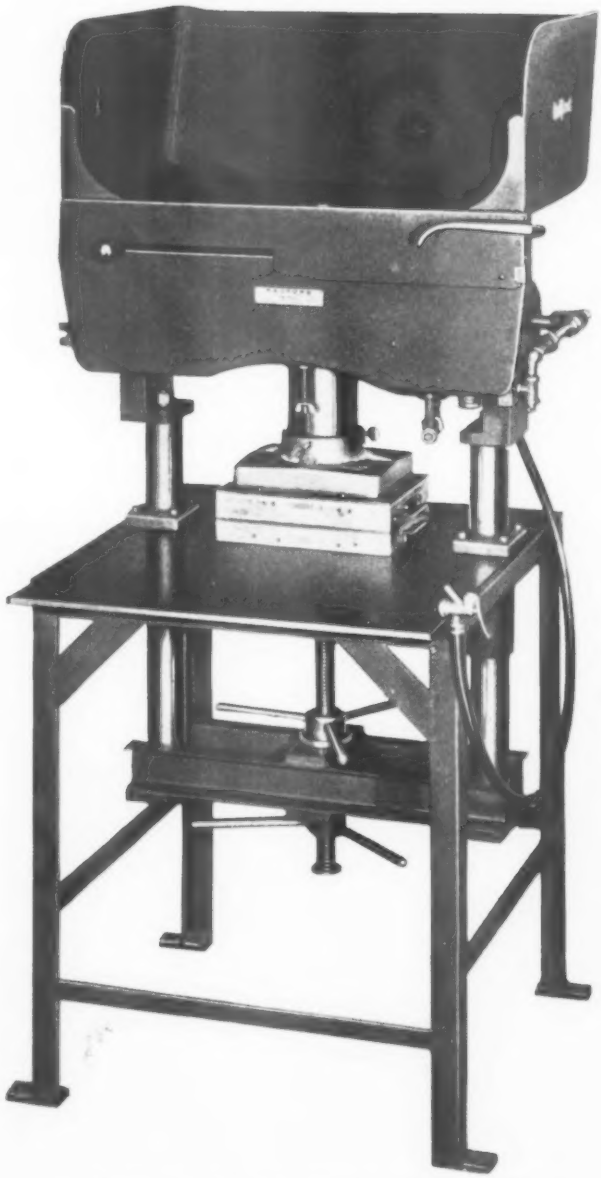
These calculations were based on keeping the plant at 60° F 24 hours daily with zero outdoor temperature. Since installation of the new heaters the results have exceeded expectations in fuel economy and comfortable working conditions.

Units installed to replace the salamanders are four Dravo Counterflo heaters of the type shown here. They are located about 80 ft apart along the north wall of the foundry and machine shop, and occupy a total of only 150 sq ft. The salamanders required about 975 sq ft. Two of the heaters have an output capacity of 1,750,000 Btu per hour each and the other two have 1,500,000 Btu capacity each. They can handle air at 19,000 and 17,000 cfm, respectively. The heaters recirculate warm air in the working zone—up to 12 ft above the floor—discharging it above head height through directional nozzles. This method tends to reduce heat losses through the roof but does not interfere with natural draft that carries away process smoke and fumes.

The NEW

Redford NO. 2 CORE BLOWER

STATIONARY MAGAZINE TYPE



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More production with the new and original ***REDFORD NO. 2.*** *New standards are being set,* ***not only because the*** *machine itself is fast, but because* ***every motion of your*** *operator has been correctly evaluated to obtain a maximum of production with a minimum of effort.*

8 OUTSTANDING FEATURES:

1. Large stationary work area of convenient height. All work can be done right on the machine table, eliminating unnecessary handling of core boxes.
2. Large sand supply hopper directly in front of the operator and readily accessible.
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7. Quick change, fully adjustable, automatic clamping attachment for vertically split core boxes.
8. * Actuating one handle puts the machine through the complete cycle of clamping the core box, blowing the core and releasing the core box, in two seconds.

*Any core blowing machine will blow a core in a few seconds. Related operations and human fatigue are the important factors in setting your rate of production. The New Redford has been developed to give both unequalled performance and unequalled ease of operation.

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ACTIVITIES OF FOUNDRY Groups

Eastern Canada

A QUIZ Night program was staged by the Eastern Canada Chapter of the AFS at its Feb. 10 meeting held at the Mount Royal Hotel, Montreal, Que. Quizmaster was Morris McQuiggan, Canadian Foundry Supplies & Equipment Ltd., Montreal, with E. Winsborrow, Shawinigan Foundries Ltd., Shawinigan Falls, Que., and J. Grieve, Dominion Engineering Work Ltd., Lachine, Que., as judges. The panel included: H. Louette, Warden King Ltd., Montreal; J. Hunt, Dominion Engineering Works Ltd., E. Murphy, Canadian Car & Foundry Ltd., Montreal; James G. Dick, Canadian Bronze Co. Ltd., Montreal; C. H. Poirie, Montreal Technical School and S. L. Gertsman, Bureau of Mines, Ottawa, Ont.

Special guests were Victor Zang, Unitcast Corp., Toledo, and E. N. Delahunt, Warden King Ltd., both national directors of the AFS, as well as several representatives of the Ontario Chapter who were in Montreal.

Members of the Eastern Canada chapter are looking forward to meeting a representative group of Canadian foundrymen at the Canadian dinner which is planned for May 9 at the Statler Hotel, Cleveland, during the convention and exhibition of the American Foundrymen's Society. —*A. J. Moore, Montreal Bronze Ltd.*

Central New York

NINTH annual stag party of the Central New York Chapter of the AFS was held Jan. 14 at the Onondaga Hotel, Syracuse, N. Y. with 190 members and guests present to enjoy the dinner, entertainment and drawing for the large number of door prizes.

James O. Ochsner, Crouse-Hinds Co., Syracuse, chairman of the committee in charge of arrangements, was assisted by J. A. Feola, Crouse-Hinds Co.; W. D. Dunn, Oberdorfer Foundries; Frank Wheeler, Kimman & Wheeler; James Ogden, Cleveland Tramrail Co.; Robert Wright, U. S. Graphite Co.; Bruze Artz, Pangborn Corp.; Francis Troy, F. F. Shortsleeve Co.; and Jacob P. Kratz, Crouse-Hinds Co.

Regular meeting of the chapter was held Feb. 10 at the Onondaga Hotel, Syracuse, with 80 members and guests present. J. F. Livingston, chapter chairman, expressed thanks to E. E. Hook, Dayton Oil Co., Syracuse, and to the members of the New York State Regional Conference committee for their contribution to the success of the conference. Also he complimented the committee which arranged the chapter's successful stag party.

S. C. Massari, technical director of the American Foundrymen's Society, presented the society's research film,

(*Continued on page* 158)

EASTERN CANADA CHAPTER of the AFS held a quiz night at its regular meeting Feb. 10 at the Mount Royal Hotel, Montreal. The quizmaster and his panel of experts are shown above. Left to right, front row, are: C. H. Poirie, Montreal Technical School; S. L. Gertsman, Bureau of Mines, Ottawa, Ont.; Morris McQuiggan, Canadian Foundry Supplies & Equipment Ltd., Montreal, quizmaster; E. Murphy, Canadian Car & Foundry Ltd., Montreal, and H. Louette, Warden King Ltd., Montreal. Back row: John Hunt, Dominion Engineering Works Ltd., Lachine, Que., left, and James G. Dick, Canadian Bronze Co. Ltd., Montreal

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(*Continued from page* 156)

"Fluid Flow in Transparent Molds," introducing it with a resume of work being done by the various AFS research committees. In conclusion he pointed out that since the film has been completed, more work has been done on the project. A report will be presented at the convention in Cleveland and preprints will be available early this spring.—*J. A. Feola, Crouse-Hinds Co.*

Cleveland Non-Ferrous

REGULAR monthly meeting of the Cleveland Chapter, Non-Ferrous Founders' Society was held at the Cleveland Athletic Club, Cleveland, Feb. 16. Approximately 40 members and guests were present.

Dr. R. T. Maneely, Hoffman Bronze & Aluminum Casting Co., and chairman of the chapter, announced that the nominating committee proposed the following officers for 1950-51: Chairman, W. S. Beckenbach, Proof Machine & Brass Foundry Co.; vice chairman, Dr. R. T. Maneely; treasurer, E. J. Metzger, Wellman Bronze & Aluminum Co., and secretary, David Kennedy, Gluntz Brass & Aluminum Foundry Co. As no further nominations were received, the chairman declared the officers elected by acclamation.

James W. Wolfe, executive secretary, Non-Ferrous Founders' Society, Chicago, spoke briefly on various activities of the national organization in behalf of its members, and then presented some information on a new molding procedure for production of both nonferrous and ferrous castings. Known as the "C" process after its inventor, Dr. Croning, the method was developed in Germany, and employs fine sharp silica sand with a resin bond. Sands range from 120 to 150 fineness, and the bond content from 5 to 9 per cent. These are mixed together and placed over the pattern which is heated to around 500° F, and allowed to remain about two seconds. This produces a shell of material about ⅛-in. thick on the pattern, the excess material being removed by turning the pattern over. Pattern and shell are placed in an oven for two minutes at about 600° F which polymerizes or hardens the resin. The shell is removed from the hot pattern, and allowed to cool. Each shell forms a half mold, and two are joined together with a paste of sodium silicate. Complete molds are backed up with shot or sand. According to the speaker, two men can produce 90 complete molds per hour. The process produces castings which have comparatively smooth surfaces free from adhering sand.—*Edwin Bremer.*

CENTRAL NEW YORK Chapter of the AFS held its ninth annual stag party Jan. 14 at Onondaga Hotel, Syracuse, N. Y. Committee in charge of the party is shown in top view. Front row, left to right, are: Bruce Artz, Pangborn Corp.; John Feola and Jake Kratz, Crouse-Hinds Co.; James Ogden, Cleveland Tramrail Co., and Robert Wright, U. S. Graphite Co. Back row, left to right, are: William Dunn, Oberdorfer Foundries Inc., Francis Troy, F. F. Shortsleeve Co.; James Ochsner, Crouse-Hinds Co., and Frank Wheeler, Kimman & Wheeler

New Jersey

AN increasingly active demand for materials handling equipment by foundries prevails, Thomas M. Parlon, sales engineer, Yale & Towne Mfg Co., Philadelphia, told the New Jersey Foundrymen's Association at Military Park Hotel, Newark, N. J., Feb. 20. Paced by advancement in production equipment, there have been important strides in the design and application of handling facilities, which have stimulated demand.

In modernizing materials handling facilities, he said it is important first to formulate an overall plan and then appoint one man either from within the organization or from the outside to be responsible for the job. Materials handling principles, Mr. Parlon said, do not differ materially, but each plant represents a variety of problems which must be considered collectively before going ahead with a general program.

Speaking particularly with regard to the handling problems of the average-sized foundry, Mr. Parlon gave his views on the relative merits and appropriate applications of monorail, truck and other types for handling castings, pig iron, coke, sand and molten metal. Describing the equipment, he mentioned in particular a ladle truck with a device for pouring directly from the truck. He illustrated his remarks with slides.

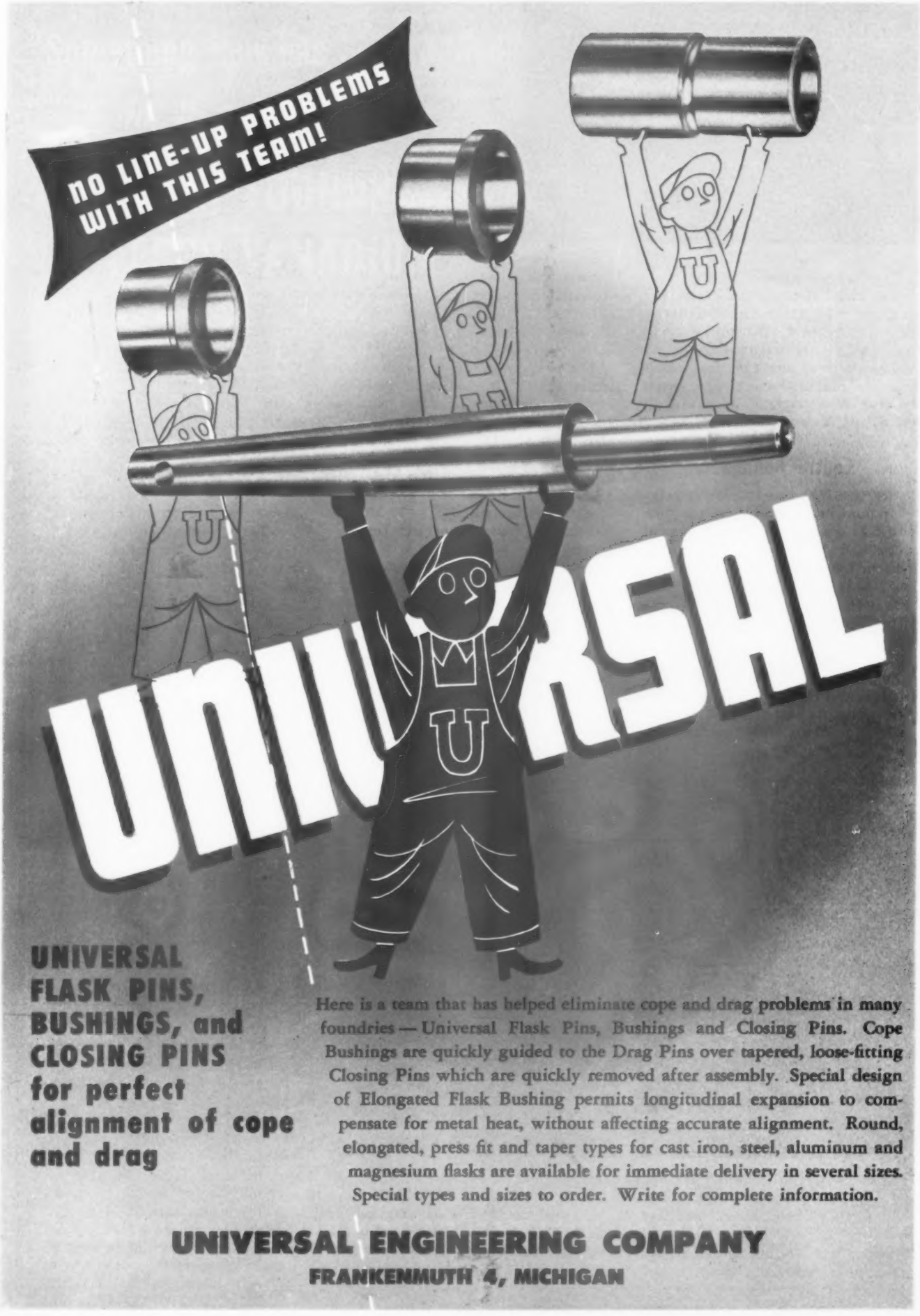
Discussing business conditions among the local foundries, John L. Carter, secretary, said there had been little pickup in demand for gray iron castings, although there had been a substantial gain recently in nonferrous casting requirements.—*B. K. Price.*

Metropolitan

SUBJECT discussed at the February meeting of the Metropolitan Chapter of the AFS, held at the Essex House, Newark, N. J., was "Modern Foundry Refractories."

The speaker, J. H. Rickey, production manager, Ironton Fire Brick Co., Ironton, O., illustrated the talk with slides showing how various refractories are manufactured. He stressed the use of plastic firebrick for lining various foundry ladles and a number of the slides showed the proper procedures in installing plastic fire brick. About 90 members were present.

(*Continued on page* 160)



UNIVERSAL FLASK PINS, BUSHINGS, and CLOSING PINS for perfect alignment of cope and drag

Here is a team that has helped eliminate cope and drag problems in many foundries — Universal Flask Pins, Bushings and Closing Pins. Cope Bushings are quickly guided to the Drag Pins over tapered, loose-fitting Closing Pins which are quickly removed after assembly. Special design of Elongated Flask Bushing permits longitudinal expansion to compensate for metal heat, without affecting accurate alignment. Round, elongated, press fit and taper types for cast iron, steel, aluminum and magnesium flasks are available for immediate delivery in several sizes. Special types and sizes to order. Write for complete information.

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METROPOLITAN Chapter of the AFS met Feb. 6 to hear J. H. Rickey, production manager, Ironton Fire Brick Co., Ironton, O., discuss "Modern Foundry Refractories." He is shown at left in the photo with John Bing, Metropolitan Refractories Corp., New York, who introduced him

(*Continued from page* 158)

John Bing, Metropolitan Refractories Corp., New York, served as technical chairman. Discussing the United States refractories industry, he pointed out that the first plant built for manufacturing fire brick was near Woodridge, N. J. in 1825.—*Carl Szego, Moldcast Products Inc.*

Central Indiana

DISCUSSING uses to which magnesium castings can be adapted, George H. Found, manager, technical service and development, Magnesium Division, Dow Chemical Co., Midland, Mich., addressed 80 members of the Central Indiana Chapter of the AFS at the Athenaeum, Indianapolis, Feb. 6.

Mr. Found pointed out the various casting types in which magnesium is practical and those where some other metal would be better suited. He also discussed methods of design for magnesium and other light metals, illustrating the points with slides. Paul Lee Hargitt, Light Metals Inc., Indianapolis, served as technical chairman.

The chapter's Mar. 6 meeting featured E. E. Braun, plant manager of the Danville, Ill. plant, Central Foundry Division, General Motors Corp., whose address and demonstration on "Progress with Motion Study and Better Methods," attracted more than 225 members and guests. Mr. Braun was assisted by S. T. Martin, production manager of the Danville plant.

The demonstration, followed by a motion picture, graphically illustrated the effect of fatigue and the speed-up in production possible through improved methods as a result of simple motion studies. Motion study, Mr. Braun explained, can be described as "a way of providing an arrangement of tools and materials for most effective use."

CENTRAL INDIANA Chapter of the AFS met at the Athenaeum, Indianapolis, Feb. 6 to hear George H. Found, Technical & Service Division of the Magnesium Division, Dow Chemical Co., Midland, Mich., speak on "Magnesium Design and Its Uses." Shown above, left to right, are: S. F. Swain, Golden Foundry Co., Columbus, Ind., chapter chairman; Mr. Found; Paul Lee Hargitt, Light Metals Inc., Indianapolis, technical chairman, and Jack Giddens, International Harvester Co., Indianapolis, chapter vice chairman. Photo was furnished through the courtesy of the staff photographer of International Harvester Co.

Mr. Martin, who presented the demonstration while Mr. Braun spoke, contrasted old methods in the production of cores with new methods developed through motion study. Mr. Martin also commented on the film which showed old methods and those developed through motion studies in the Saginaw Malleable Plant of Central Foundry Division.—*William K. Mitchell, L. W. & W. K. Mitchell Co.*

Pittsburgh

R. A. COLTON, research metallurgist, Federated Metals Division, American Smelting & Refining Co., discussed "Melting Practice For Copper Base Alloys" at the Feb. 20 meeting of the Pittsburgh Foundrymen's Association at the Fort Pitt Hotel, Pittsburgh.

Mr. Colton stated that if it is true a variety of gating and risering techniques will produce sound castings, it is also true that more than one melting practice for copper base alloys will produce good quality metal. However, despite the numerous satisfactory melting practices, it is apparent from theoretical considerations that there is one easiest practice, one method most foolproof and least likely to give variable results.

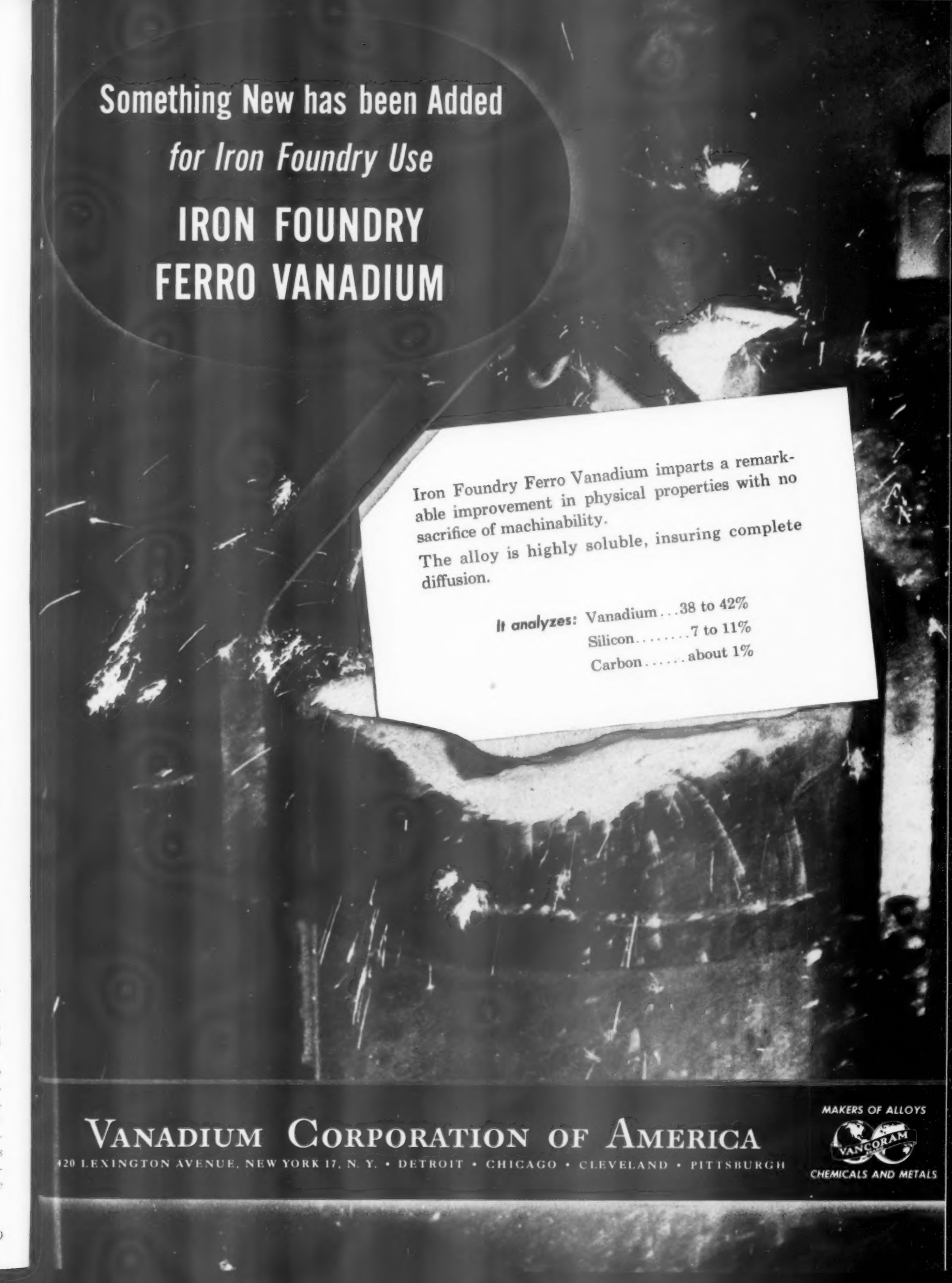
In general, Mr. Colton pointed out that with all copper-base alloys it is wise to melt with an oxidizing atmosphere where there is a slight excess of oxygen or carbon dioxide in the products of combustion. An oxidizing atmosphere over the molten metal minimizes the amount of hydrogen that can dissolve in the metal (by oxidation of the hydrogen). Such practice builds up the oxygen (or oxide) content of the metal. Then by use of a deoxidizer, such as phosphorus, the excess oxygen is controlled and the results should be sound metal free of gas porosity.—*Joseph C. Sullivan.*

Reading

APPROXIMATELY 125 members and guests attended the Feb. 21 meeting of the Reading Foundrymen's Association, held at the Berkshire Hotel, Reading, Pa., to hear Ralph L. Lee, public relations department of General Motors Corp., Detroit. His talk was entitled. "Man to Man on the Job."

Mr. Lee stressed the importance of knowing facts about human behavior in developing technical programs in business. He explained that every individual in the world is different from any other and behaves accordingly. "Individuals take personal pride in their differences," Mr. Lee

(*Continued on page* 162)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(*Continued from page 160*)
pointed out. One of an employer's jobs is to know the character and abilities of his employees. Paul B. Harner, Union Mfg. Co., Boyerstown, Pa., a past president of the association, presided and introduced the speaker.—*W. I. Cassidy.*

Northwestern Pennsylvania

TWO interesting meetings were held during February by the Northwestern Pennsylvania Chapter of the AFS. The first, in Oil City, Pa., Feb. 17, featured Thomas E. Eagan, chief metallurgist, Cooper-Bessemer Corp., Grove City, Pa., whose topic was "Nodular Iron." Chester H. Hahn, National Transit Pump & Machine Co., Oil City, Pa., was chairman of the meeting which 75 foundrymen attended.

On Feb. 27 at the Moose Club, Erie, Pa., W. B. McFerrin, Electro Metallurgical Division, Union Carbide & Carbon Corp., Detroit, spoke to nearly 100 members and guests on casting defects and how they should be treated in iron and steel foundries.

The speaker stated that accurately kept charts can be of great help. Remedies are found to cure casting defects but because they are not recorded, the same conditions arise many times causing loss of time and effort and increased scrap. Harold Lolly, Bucyrus-Erie, Co., Erie, was discussion leader.

The movie, "Men and Molds" produced by the Lynchburg Foundry Co., Lynchburg, Va., was well received. Guests at the meeting were John E. Mullen, vice president in charge of sales, National Erie Corp., Erie, and vice president of the Steel Founders' Society of America; and Sterling Farmer, Sand Products Corp., Cleveland.

Roger Griswold, Erie Malleable Iron Co., chairman of the chapter's educational committee, was appointed by Chairman Joseph Shuffstall to confer with supervisors of the Erie Veterans School in regard to establishing a foundry class in that school in the near future.—*Earl M. Strick, Erie Malleable Iron Co.*

Tennessee

TWO speakers were featured at the Jan. 27 meeting of the Tennessee Chapter of the AFS held at Hotel Patten, Chattanooga. Approximately 100 members and guests were present to hear Dr. H. K. Salzberg, research chemist, Chemical Division, Borden Co., Philadelphia, discuss "Foundry Sand Practice Using Plastic Binders," and J. Wesley Cable,

(*Continued on page 164*)

NORTHEASTERN OHIO Chapter of the AFS met Feb. 9 at Tudor Arms Hotel, Cleveland. The program, sponsored by the patternmaking division, featured a talk on "Patternmaking in Foundry Work" by A. F. Pfeiffer, Allis-Chalmers Mfg. Co., Milwaukee. Photos by Sterling Farmer, Sand Products Corp.

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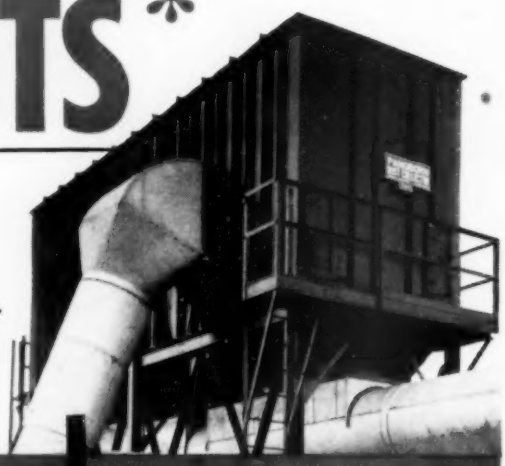

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(*Continued from page* 162)

electrical engineer, speak on "High Frequency Core Baking." Karl Landgrebe, the Wheland Co., Chattanooga, and chairman of the chapter, presided; Paul A. Arnold, United States Pipe & Foundry Co., Chattanooga, chapter vice chairman, was in charge of the program.

Dr. Salzberg, illustrating his talk with slides, showed tables of results using synthetic binders under various intensities of heat and with varying quantities of water. He explained that synthetic binders left too long in a hot oven tend to lose strength and that the quantity of water added also has a vital effect on strength. The speaker pointed out that urea resins at the present time are superior for dielectric ovens and that phenolic resins offer great hot strength and release gases more slowly. Baking time with synthetic binders could be reduced one half.

Second speaker, J. Wesley Cable, showed with slides representative installations of dielectric ovens in foundries, and the various types of cores being cured in them.—*Carl A. Fischer Jr., Fischer Supply Co.*

Central Ohio

THE subject of "Sand" was discussed by Prof. D. C. Williams, Ohio State University, at the Feb. 13 meeting of Central Ohio Chapter of the AFS. About 65 members were present for the meeting at the Chittenden Hotel, Columbus, O.

The speaker pointed out that sand is defined as a particle-size classification of nonmetallic minerals. Although foundrymen frequently think of silica sand as being synonymous with "sand," other materials such as limestone, zircon, and even coal or coke are sands if their particle sizes are suitable. The difference between naturally bonded sands and synthetic sands were pointed out. Professor Williams considers it unfortunate that the word "synthetic" was adopted for molding sands; he feels that "compounded" would be a better term.

Disadvantages of the AFS clay designation were discussed. The Buoyoucos-hydrometer method of determining particle-size distribution was described as an improvement over the AFS washing method. Milford silt was used as an example of a sand yielding widely divergent results in the AFS clay-washing tests and the hydrometer tests. In the washing test, Milford silt shows about 85 per cent AFS clay while hydrometer data show that only about 3 per cent of the material is finer than 2 microns. Since only

(*Continued on page* 166)

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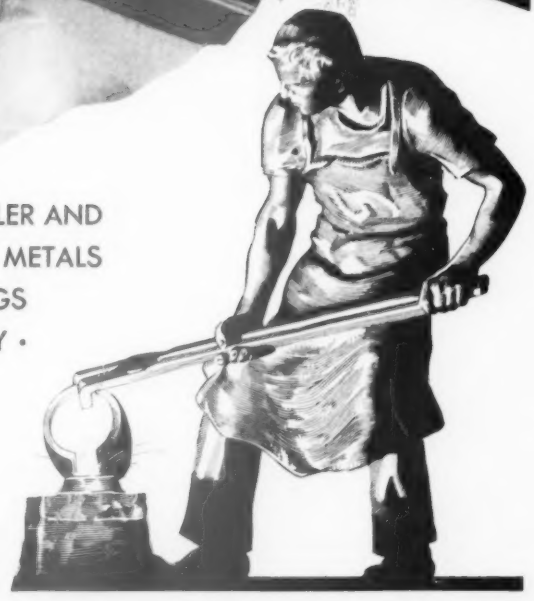

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(*Continued from page* 164)
material finer than about 2 microns constitutes bonding power, it is obvious the AFS clay determination can be misleading.

The AFS-Battelle movie, "Fluid Flow in Transparent Molds," was also shown. J. H. Jackson, supervisor, Battelle Memorial Institute, supplied the narration.

J. Gray Lummis, A. P. Green Fire Brick Co., tendered his resignation as vice chairman of the chapter because business assignments will take him out of town. Fred Davis, Oliver Co., Springfield, O., was appointed to succeed Mr. Lummis—*H. W. Lownie Jr., Battelle Memorial Institute*

Detroit

A THREE-STAR symposium on mold and core blowing drew approximately 200 members of the Detroit Chapter of the AFS to the Rackham Educational Memorial, Feb. 17, with visitors present from Chicago, Cleveland, Canada and eastern Michigan.

Details of a new expendable type corebox for use in blowing were revealed by Harry J. Jacobson, Industrial Pattern Works, Chicago. The boxes are of aluminum-base alloy, are produced to precision dimensions without machining, often within 0.002-in. and with many types of small cores, show a life equivalent to that of conventional boxes. One, for example, showed no serious deterioration after about 800,000 blows, with no steel facing or "armor" used. Since the boxes are far less costly than cast iron and steel units which require heavy investment in man-hours for machining, they can be discarded when worn and replaced by a new box. The largest made to date measures 14 x 19 in.; hence their principal application has been to small, light, multiple cores.

Blowing green sand molds was discussed by Harold E. Pridmore, president, and Lawrence D. Pridmore, treasurer, International Molding Machine Co., La Grange Park, Ill. They pointed out mold blowing was nothing new, records showing it had been tried as early as 1914, while during the past 15 years many plants have found it practical. Two types of mold blowing are practiced: Straight blowing into the flask, the most difficult method; and metering a measured amount of sand into the blower, filling the flask and finally applying a high-pressure hydraulic squeeze to the top of the mold to produce a high hardness on the surface of the mold impression. Blowing is done at shop air pressures, 80-90 pounds. Moisture has been varied from 3.5 per cent to an extreme high of 9 per cent.

The process is exceptionally fast, ranging from 7 to 11 seconds per mold. For this reason it may be difficult to integrate mold blowing to a conveyorized or line operation. In one case where it was adopted for molds casting motor end shields, 25 molds were produced in 90 seconds, each requiring the hand setting of one core.

Sand of 100-150 permeability is preferred, and for some reason blowing tends to concentrate fines against the pattern, while the backing sand remains fairly open. Much remains to be discovered about the flowability of sand, probably the most important factor bearing on successful mold blowing. The Pridmores in their research found sand actually to be "rubbery," not coming to rest after an impact squeeze. Further, varying the speed of the impact in blowing results in changes in sand flowability.—*A. H. Allen.*

SOUTHERN CALIFORNIA Chapter of the AFS held a joint meeting with the local chapter of the American Society of Metals, Feb. 10, at the Rodger Young Auditorium, Los Angeles. Shown above at the meeting are, left to right: Leonard Hofstetter, Brumley-Donaldson Co., Los Angeles, past president of Southern California Chapter AFS; Harold Pagenkopp, Angelus Pattern Works, Huntington Park, Calif., chapter secretary; Henry Howell, Howell Foundry Co., Los Nietos, Calif., chapter treasurer; Robert Gregg, Reliance Regulator Division, Alhambra, Calif., national director of the AFS; John E. Wilson, Climax Molybdenum Co., Los Angeles, chapter vice president, and Earle Shomaker, Kay-Brunner Steel Products Corp., Alhambra, chapter president

Southern California

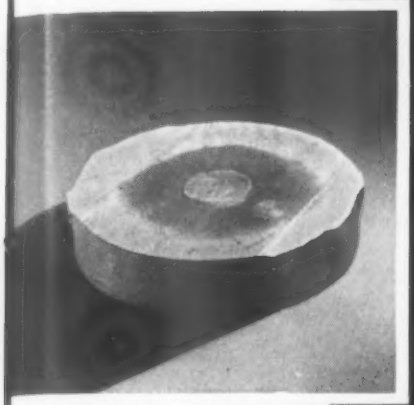
A JOINT meeting of the Southern California Chapters of the American Society for Metals and American Foundrymen's Society was held Feb. 10 at the Rodger Young Auditorium, Los Angeles. Due to urgent European business, Gosta Vennerholm, supervisor of metallurgical research for the Ford Motor Co., Dearborn, Mich., was unable to be present as scheduled. However, the speaking assignment was capably filled by Hugo W. Hiemke, California Alloy Products Co., whose subject was "The Use of Castings in Welded Assemblies."

Mr. Hiemke pointed to the advantages of castings, including production of complex shapes, obtaining specific compositions and economy of production. He also cited these disadvantages of cast products: Rejected parts when reaching the machine shop, cost and time to make patterns for small quantities. Mr. Hiemke said welded products are advantageous in these two instances and that some companies prefer wrought products over castings because of fewer rejects, even if the parts should not really be wrought. In conclusion the speaker showed slides illustrating cases where a complex casting had been produced more simply and economically by redesigning it into several smaller castings and welding them together, as well as slides of graphs, welded castings and welded assemblies.

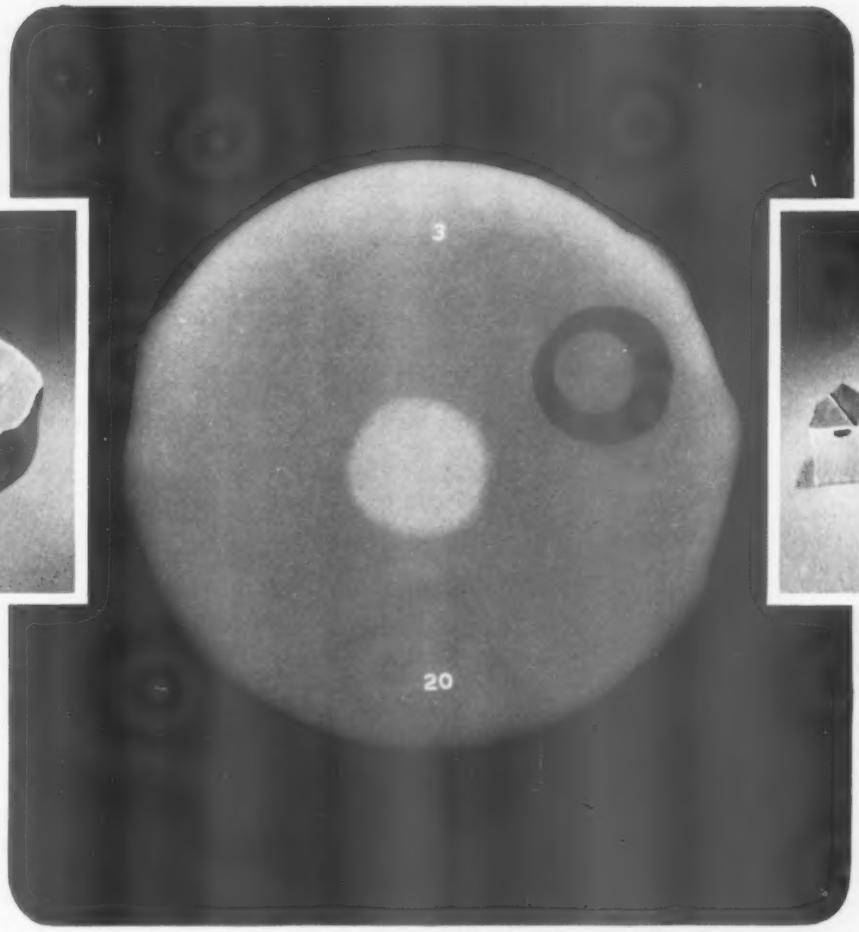
Considerable interest was shown in the casting display arranged by a committee consisting of Robert Haley, Advance Aluminum & Brass Co., Los Angeles, chairman; Robert Gregg, Reliance Regulator Corp., Alhambra, Calif.; and William Emmet, Los Angeles Steel Castings Co.

Among those present at the meeting were the participants of the AFS chapter's apprentice patternmakers contest. First prize was awarded to Robert V. Bowers, Madsen Iron Works; second to Daniel C. Burdick, Consolidated Pattern Works and third to Gordon Dally, Byron-Jackson Co.

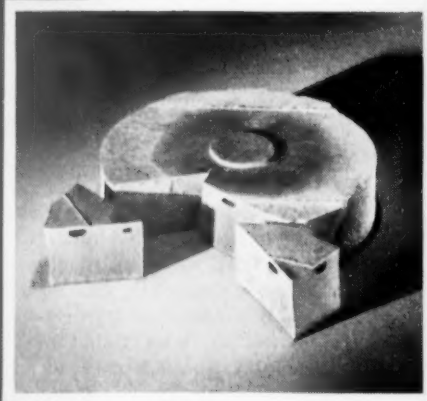
(*Continued on page* 168)



Aluminum alloy casting 2¼ x 1¼" for aircraft accessory part.



Radiograph which revealed defect in casting.



Section reveals hole detected by radiography.

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(*Continued from page* 166)
Judges were James Eppley, Axelson Mfg. Co., Harold Bierly, Production Pattern Co., and Lloyd Jensen, Pattern Craft Co.

The chapter's Apr. 14 meeting features L. P. Robinson, Werner G. Smith Co., Cleveland, whose topic is "Cutting Costs in the Core Room." Also, the Naval Research Laboratory films, "Finger Gating" and "Step Gating" will be shown.—*W. G. Stenberg, U. S. Electrical Motors Co.*

Michiana

PROGRAM of the Feb. 7 meeting of the Michiana Chapter was planned to appeal particularly to patternmakers but was equally interesting to all foundrymen present. The meeting was held at the LaSalle Hotel, South Bend, Ind. The speaker was Vaughn C. Reid, City Pattern Foundry & Machine Co., Detroit, whose subject was "Materials Used in the Construction of Production Pattern Equipment."

The chapter's Mar. 7 meeting, held at the Spaulding Hotel, Michigan City, Ind., featured William G. Gude, managing editor of THE FOUNDRY, who discussed recent trends in the foundry industry.

William Romanoff, vice president and technical superintendent, H. Kramer & Co., Chicago, will be the speaker at the Apr. 4 meeting of the chapter to be held at Hotel Elkhart, Elkhart, Ind.—*J. P. Jordon, Dodge Mfg. Corp.*

Ohio State

CHILLS and chaplets were topics of discussion at the Feb. 9 meeting of the Ohio State University Student Chapter of the AFS. Special guests were John T. Hawley, Fanner Mfg. Co., Cleveland, and Charles T. Greenidge, Battelle Memorial Institute, Columbus, O.

Mr. Hawley showed two films covering in detail the manufacture and use of chills and chaplets. Following the showing, Mr. Hawley and Mr. Greenidge discussed the two products, distributed samples of a variety of chaplets and explained their special uses. Mr. Hawley pointed out that oil, moisture and rust on chaplets can cause improper fusion and porosity within the casting. Also, if a green sand mold containing chaplets is allowed to stand for some time before pouring, moisture from the mold will condense on the cold metallic surfaces. It was also emphasized that clean surfaces on chills is important for satisfactory results.

Following the business meeting, the monthly award for outstanding work in the interest of the chapter was presented to David Baker.—*Dallas M. Marsh.*

Philadelphia

REGULAR meeting of the Philadelphia Chapter of the AFS was held at the Engineers Club, Philadelphia, Feb. 10, and was attended by 150 members and guests. Principal speaker was E. W. Troy, National Engineering Co., Chicago, who spoke on "Sands." Mr. Troy discussed foundry sands at their basic levels, trends in sand compounding, testing and uses.—*Albert J. Saute, American Engineering Co.*

Saginaw Valley

A DISCUSSION of nodular iron attracted 200 members and guests of the Saginaw Valley Chapter of the AFS to the Feb. 2 meeting held at the Fischer Hotel, Frankenmuth, Mich. Principal speaker was Charles O. Burgess, technical director Gray Iron Founders' Society, Cleveland, who presented a concise progress report on the development and use of nodular iron. The report was illustrated with slides showing structural and physical properties of the material. Howard H. Wilder, metallurgist, Eaton Mfg. Co., Foundry Division, Vassar, Mich., led the discussion period which followed.—*Kenneth H. Priestley, Vassar Electroloy Products Inc.*

SAGINAW VALLEY Chapter of the AFS met at the Fischer Hotel, Frankenmuth, Mich., Feb. 2 to hear Charles O. Burgess, technical director, Gray Iron Founders' Society, discuss nodular iron. Mr. Burgess, at right in the photo, is shown with Howard H. Wilder, Eaton Mfg. Co., Vassar, Mich., chapter vice chairman

Central Illinois

FUTURE of the Foundry Industry" was described at the Feb. 6 meeting of the Central Illinois Chapter of the AFS held at the Jefferson Hotel, Peoria, Ill. James H. Smith, general manager, Central Foundry Division, General Motors Corp., Saginaw, Mich., was the speaker.

Mr. Smith first cited instances wherein high production parts formerly cast are now being supplied by competitive methods. Indirect reasons for this vary, but include: Loss of technical and supervisory people in recent years; increased costs while quality of basic materials have not materially improved; lack of conscientious cost reduction; aggressiveness of competitive methods. Also, Mr. Smith believes there still exists too much nonuniformity in castings, and relative to this, he recommended strongly continuous type annealing of gray iron.

As a means of recovering losses, the speaker suggested more consideration of modernization; cost reduction by more productive methods; elimination of fatigue on the job, and new and improved sales approaches to sell the advantages of castings to cost-conscious engineers and purchasing departments.

Improved production methods which Mr. Smith cited include use of pure oxygen for cupola, electric precipitation of dust in cupola operation, chemical treatment of coke, improved refractories for cupola, permanent mold uses, development of dielectric core baking and many others. Future developments include ultrasonic equipment for detection of casting defects. Problems relative to the training and attracting of young men for the future were discussed by Mr. Smith and several chapter members during the discussion period.—*John R. Nieman, Caterpillar Tractor Co.*

Cincinnati

FILMS covering work done at the Naval Research Laboratory in Washington, D. C. were presented at the Feb. 13 meeting of the Cincinnati District Chapter of the AFS held at Engineering Society headquarters. M. E. Rollman, Cincinnati Milling Machine Co., Cincinnati, chapter vice chairman, presided and 160 members and guests were present.

Speaker was William H. Johnson.

(*Continued on page* 172)

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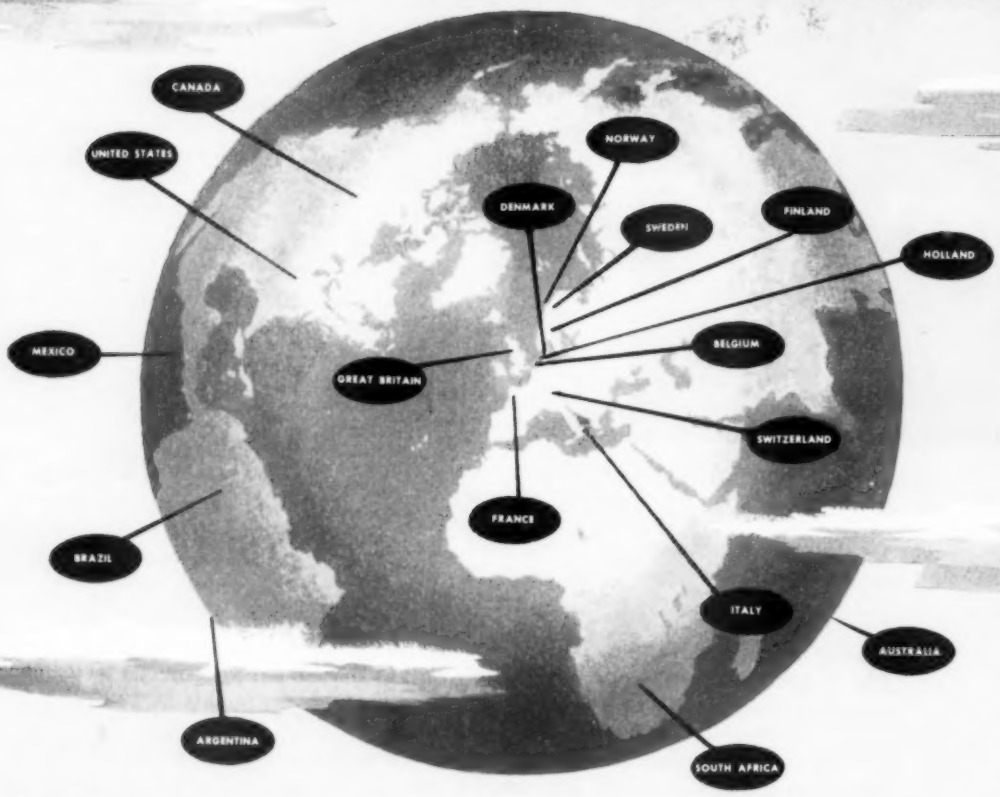

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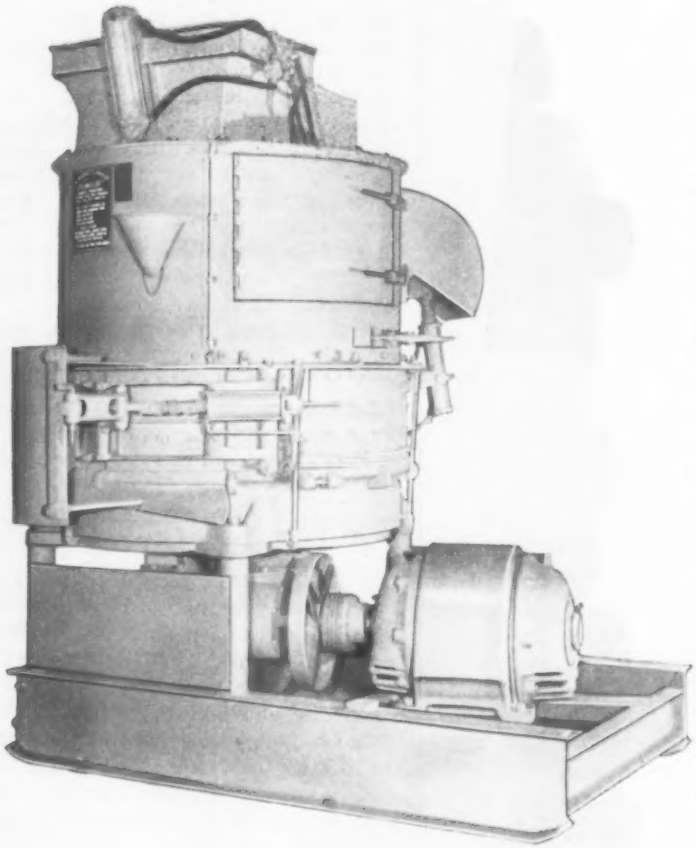

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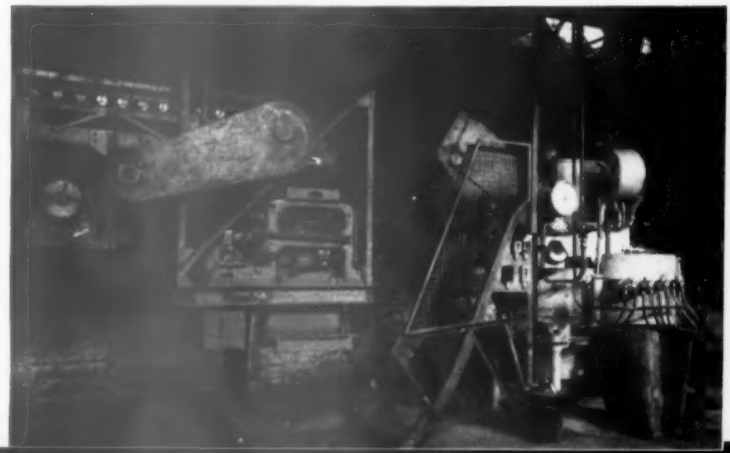
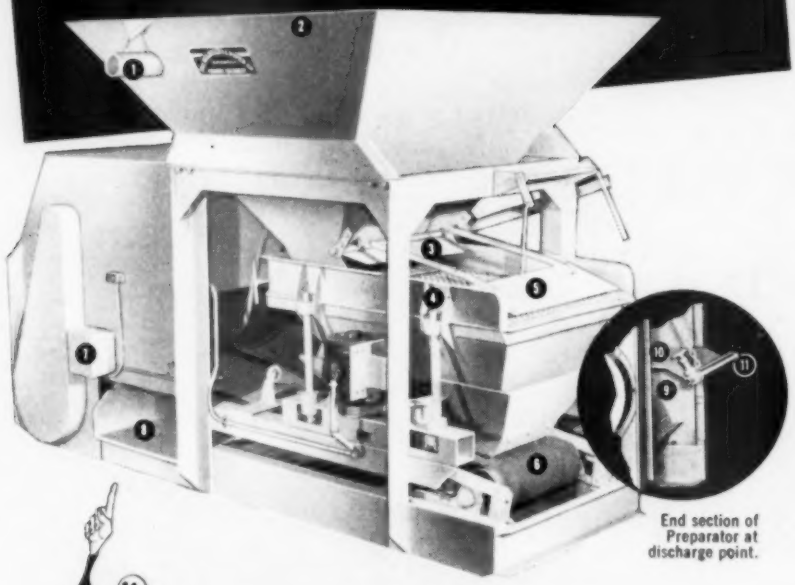
A high production, French Speemullor unit. This Model "40" supplies all of the molding sand for Renault's jobbing foundry at Billancourt France. The story of Renault's foundries appears in the April issue of BETTER METHODS. Write for your copy today!



COMPLETE SAND CONDITIONING WITH MAGNETIC SEPARATION

in one portable unit



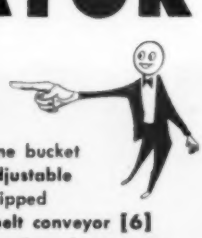
End section of Preparator at discharge point.

Here tramp iron is discharged from machine into scrap box . . . an exclusive Preparator feature.

Newly designed and streamlined, the Preparator provides your foundry with an efficient, dependable, heavy duty, portable sand conditioner. This one machine screens, breaks lumps, magnetically separates, aerates and discharges sand up to 35 feet into pile or bin. Load centered trunnions permit easy movement by crane. Rugged construction assures years of service, even with the roughest of treatment. Completely conditions up to sixty tons of sand per hour!

the PREPARATOR

HOW IT OPERATES



Preparator easily lifted by Trunnions [1]—and moved to any desired location by crane. Shakeout sand is loaded by crane bucket or loader into large open top hopper [2] and feeds through adjustable gate opening [3] onto heavy duty Gyratory Screen [4] equipped with adjustable lump breaker [5]. Screened sand drops onto belt conveyor [6] and passes over magnetic pulley [7] which separates tramp iron into scrap box [8]. The cleaned sand falls onto drum type aerator [9] which discharges it to any distance up to thirty-five feet. The adjustable deflector plate [10] controls the distance the sand is thrown. The water spray [11] at discharge point, provides final tempering.

BEARDSLEY & PIPER
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(*Continued from page* 168)

metallurgist of the Naval Research Laboratory. The films illustrated the effect of various gating systems on the flow of molten steel. The first film, "Gating Systems for Metal Casting," clearly illustrated that many systems do not do the job expected of them while the films "Finger Gating" and "Step Gating" indicated improvements which would result in a uniform sequence of flow with reduced turbulence.

The Chapter's Apr. 10 meeting will have as its speaker C. A. Sanders, vice president, American Colloid Co., Chicago, on the subject, "Modern Progress in Foundry Sand Practice." —*Fred Westermann, University of Cincinnati*

Twin City

"COREROOM Practice" was the subject presented by J. David Johnson, metallurgist for the foundry research laboratory, Werner G. Smith Co., Minneapolis, before 50 members and guests of the Twin City Chapter of the AFS at the Feb. 14 meeting held in Minneapolis.

The speaker discussed various research projects his laboratory is undertaking and stressed the importance of careful analysis of all ingredients of an acceptable core sand mixture. Specifically, Mr. Johnson described the effect of the base sands, moisture, mixing time and binder proportions on core sand mixtures. He pointed out the value in using a moistureless sand and also the part that each individual ingredient plays in binding the sand grains together.

In subsequent discussion, questions were asked regarding types of mixers, weight vs. volume measurements, water demand of pure sand and method of mixing core sands.—*Lillian K. Polzin.*

Western New York

"FOUNDRY Dust Control by Liquid Diffusion" was discussed by George A. Mau, Johnson-March Corp., Philadelphia, at the Feb. 3 meeting of the Western New York Chapter of the AFS. Meeting was held at the Sheraton Hotel, Buffalo, with 75 members present and John R. Wark, chapter chairman presiding.

Mr. Mau explained the operation of proportioning equipment, nozzles, etc., in handling various wetting agents. There is no standard wetting agent for control of dust since there are many different kinds of dust as well as differences in density, size, and combinations of materials. The speaker described various kinds of dust, including one which cannot be

seen, and gave figures on the length of time they take to settle and to travel. At present there are five kinds of surface acting materials: Wetting, penetrating, dispersing, emulsifying and foaming agents.—*Roger E. Walsh, Hickman, Williams & Co.*

Chesapeake

A talk on ductile iron was presented at the January meeting of the Chesapeake Chapter of the AFS at the Engineers Club, Baltimore. The speaker, J. Douglas James, foundry superintendent, Cooper-Bessemer Corp., Grove City, Pa., presented a number of slides of castings made of ductile iron and various tables of physical properties. The endurance limit values were remarkably high. Mr. James described a technique for pouring ductile iron castings without risers by resorting to large gating systems and fast pouring in hard dry sand molds.—*Jack H. Schaum, National Bureau of Standards.*

Eastern New York

A TALK on "Electronic Core Baking" was given by W. C. Rudd, chief engineer, Induction Heating Corp., Brooklyn, N. Y., at the February meeting of the Eastern New York Chapter of the AFS held at Circle Inn, Latham, N. Y.

Mr. Rudd dealt in general with fundamentals of electronic core baking and a comparison with conventional oven baking. The equipment described was a tunnel line apparatus with a conveyor system. Dielectric heating was generated by a vacuum tube set with a frequency in the order of 15 million cycles per second. Heat is generated in the cores as they pass between electrodes. Entire core receives the same amount of energy with temperature rise being equal through their mass regardless of cross section. The cores are baked in an average time of two to four minutes.

Principal advantages of the method is the time element and the fact that cores cannot be overbaked; also the cores baked in this manner show good dimensional stability with fewer rejections of castings due to hot tears.—*George E. Danner, American Locomotive Co.*

Canton

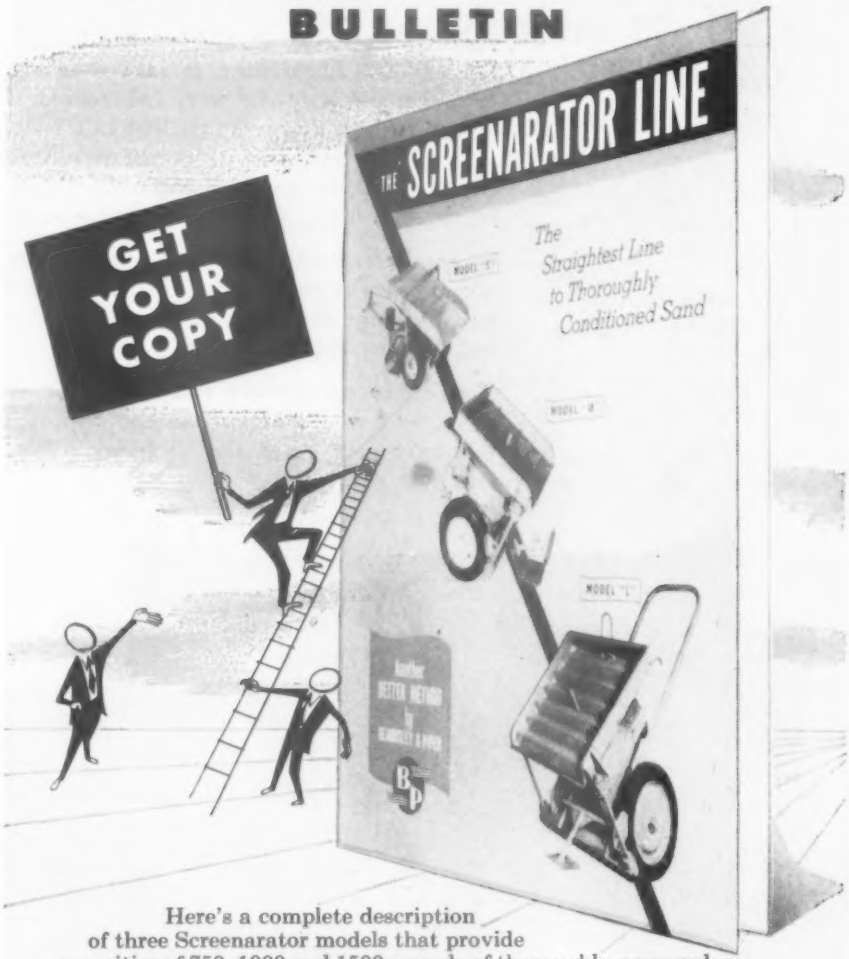
AT THE Feb. 3 meeting of Canton District Chapter of the AFS, more than 120 members and guests were present at Mergus Restaurant in Canton. The AFS research film "Fluid Flow in Transparent Molds"

(*Concluded on page* 175)

NEW

SCREENARATOR

BULLETIN



Here's a complete description of three Screenarator models that provide capacities of 750, 1000 and 1500 pounds of thoroughly prepared sand per minute. The Screenarator line is engineered to produce screened, double aerated, lump free, fluffy sand . . . at lowest initial investment and lowest cost per hour of machine operation.

All types of foundries—ferrous and non-ferrous—production and jobbing, use Screenarators to meet their needs for thoroughly conditioned sand. Castings produced in screenarated sand are of the highest quality and finish.

Regardless of the size or type of foundry, the Screenarator pays for itself in a short time. The coupon below will bring you the new Screenarator bulletin or details on free trial use of the Screenarator.

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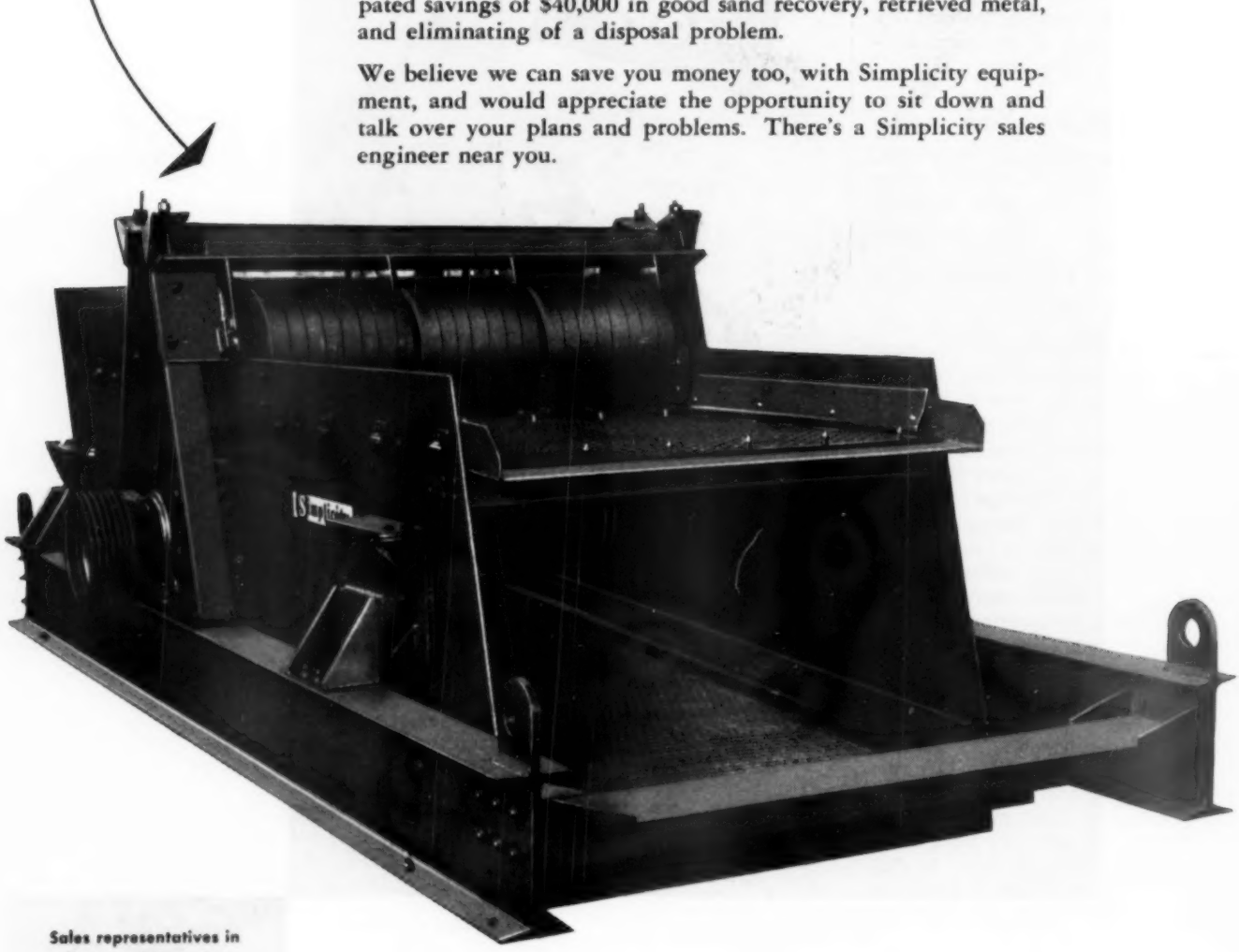
how one $5,000 crusher installation saved $80,000

Anyway you count it, $80,000 is a lot of money . . . especially for a $5,000 installation to save over a period of three years. But, that's exactly the story behind one of the first Simplicity Ring Crushers that was installed in a large automotive foundry. During the first three years, the foundry management actually saved $80,000 in new sand purchases due to the effective job done by the Simplicity Crusher on useable sand recovery.

In another instance, also in an automotive foundry, two small Simplicity Crushers, a 2′ x 6′ and a 3′ x 8′, are making anticipated savings of $40,000 in good sand recovery, retrieved metal, and eliminating of a disposal problem.

We believe we can save you money too, with Simplicity equipment, and would appreciate the opportunity to sit down and talk over your plans and problems. There's a Simplicity sales engineer near you.



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(*Concluded from page* 173)

was presented by Walter Bonsack, Apex Smelting Co., Cleveland, as the technical feature.

Al Jones, Union Metal Mfg. Co., Canton, was the coffee speaker and his subject was "Canal Systems." Mr. Jones pointed out that at one time every important city in Ohio was located on a canal were freight and passengers were transported. Boats were pulled by mules and horses at speeds of 3 to 5 miles per hour. — *Alexander Prentice, Stark Foundry Co.*

Gray Iron Research Group Meets

Operators' group of the Gray Iron Research Institute held its 32nd meeting in Columbus, O., Jan. 26-27 with 70 representatives from member companies and Battelle Memorial Institute in attendance.

The first day's sessions were held at Battelle Memorial Institute. Topics discussed were concerned chiefly with quality control of gray iron castings. Experimental cupola installation at Battelle also was inspected. At present, the cupola program is concerned with the interrelation of blast temperature and blast humidity with cupola operation. Increasing the blast temperature and decreasing the humidity in the blast were found to be effective in increasing the temperature of the iron and also carbon content, should this be desired.

The second day's sessions were held at Fort Hayes Hotel. Discussions centered on improvements in cupola operation and metallurgical control.

Officers of the operators' group are: Chairman, J. E. Reynolds, assistant to director of quality control, United States Pipe & Foundry Co., Bessemer, Ala.; vice chairman, E. Deutschlander, assistant foundry superintendent, Worthington Pump & Machinery Corp., Buffalo; secretary, H. W. Lownie Jr., assistant supervisor, Battelle Memorial Institute.

Officers of the institute elected for the current year are: President, C. R. Culling, president, Carondelet Foundry Co., St. Louis; vice president, E. B. Sherwin, president, Chicago Hardware Foundry Co., North Chicago, Ill.; secretary, E. C. Hoenicke, general manager, Foundry Division, Eaton Mfg. Co., Detroit; treasurer, W. A. Kramer, president, Advance Foundry Co., Dayton, O. D. E. Krause is executive director.

The research committee which reviews work in progress as well as developing the research program has C. F. Seelbach, vice president and general manager, Forest City Foundries Co., Cleveland, as chairman.

Book Review

Liberty—A Path to its Recovery, by F. A. Harper, cloth, 160 pages, 6 x 9 in., published by the Foundation for Economic Education, Irvington-on-Hudson, N. Y. Price $1.50 (paper cover for $1).

The author presents an analysis of the nature of individual liberty, a measure of its present status in the United States, and a proposed route to regaining lost freedom. The subject matter is presented in three parts: The design of liberty, measuring liberty, and the present problem.

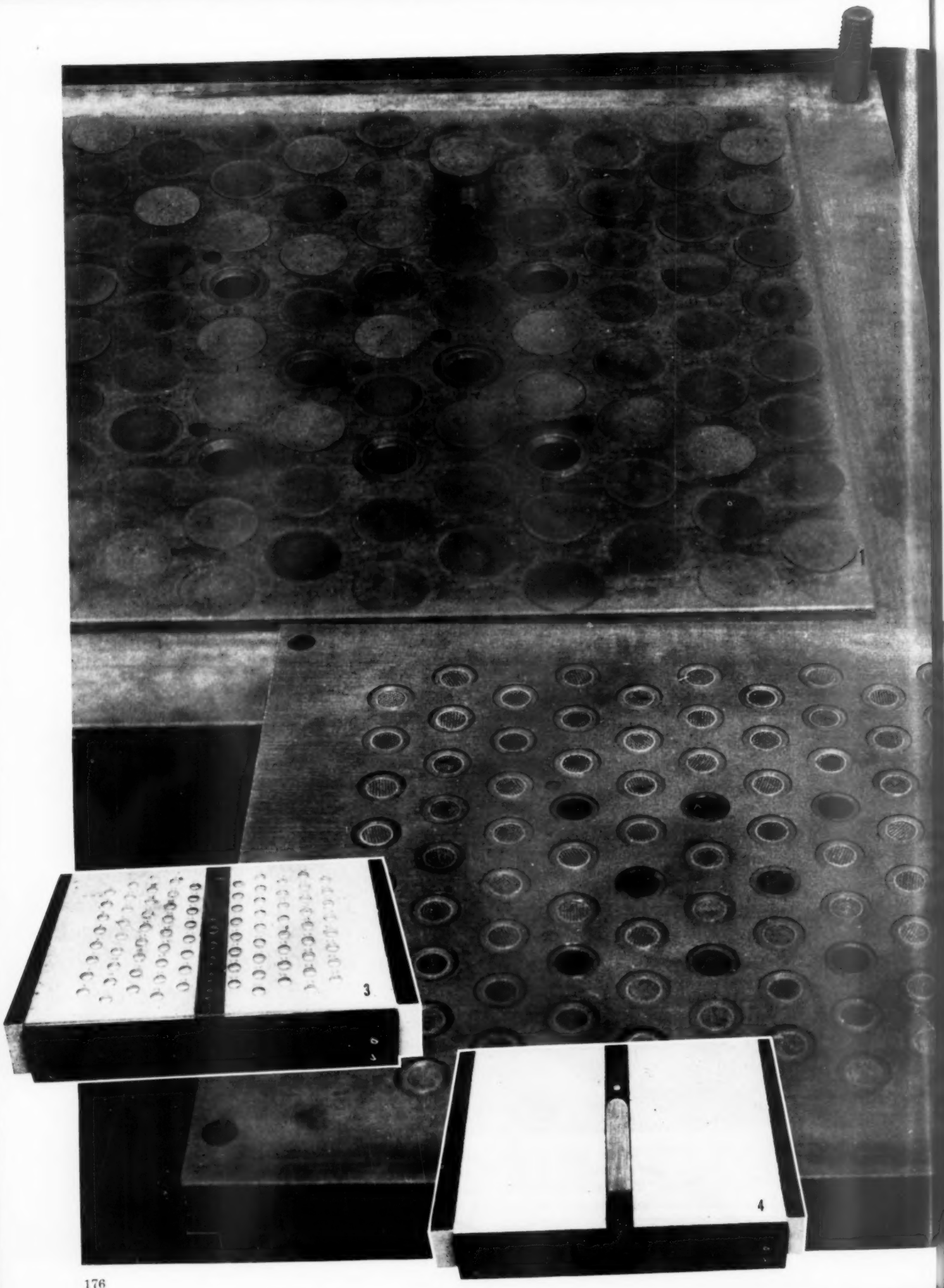
Officers Elected by 25-Year Club

Quarter Century Club of the Whiting Corp., Harvey, Ill., held its annual business meeting and election of officers Feb. 14 at Del Prado Hotel, Chicago. Now in its fourth year, the club has a membership of 140. Whiting employees are eligible for club membership when they have 25 or more years of service with the company.

New officers of the club are: President, Arthur D. Corlew; vice president, Doyle Sweet Sr.; directors, James Munro Sr., Al Westerholm, W. Guy Roy and Charles A. Geupel; treasurer, Alfred Hess, and secretary, Mary Mockton.

New members added to the club at this meeting are: Clinton B. Baker, John Begnoche, Glenn Broom, Al Carruthers, Cornelius Dunker, George P. Fisher, Jacob Onak, Martin F. Pendergast, Walter Pacyga and Kathleen Voss. They received watches in recognition of their service.

GRAY IRON FOUNDER'S SOCIETY was host to a group of 15 British foundry representatives at a luncheon at the Cleveland Hotel, Cleveland, Feb. 2. Shown above, left to right, are: Raymond L. Collier, society executive vice president; Samuel Russell, chairman and director, S. Russell & Sons Ltd., and British group leader; Walter L. Seelbach, president and general manager, Superior Foundry Inc., Cleveland, who presided at the luncheon; and Kenneth A. Harvey, project manager, Economic Co-operation Administration, Washington. Photo is by courtesy of Harold W. Wheeler, Superior Foundry Inc.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By W. PAUL MORTON
The Key Co.
East St. Louis, Ill.

A Universal Blow Plate

WHEN the Key Co. first engaged in core blowing, it was faced with three items which represent important cost considerations—metal pattern equipment, individual blow plates, and the rigging and venting of coreboxes.

The first item, the need for metal boxes, was dispatched without too great difficulty by the use of sand that has a lower flowability than the conventional blower sand, allowing wooden equipment to be used. The boxes and equipment in general have stood up very well, eliminating the metal equipment problem.

The second item is the subject of this article, the individual blow plate problem.

We have a vented blow plate on our largest blower. It has practically eliminated the necessity for venting coreboxes except for inaccessible pockets and corners, and then we resort to a few vents. Contrast this use of vents with the conventional methods when a vented blow plate is not used. This led to the consideration of developing a single blow plate that would be used on every corebox, thereby making the plate a fixed part of a machine, not an accessory.

Success of the plate depends upon exchangeable bushings that function as either a blow hole or a vent. Fig. 1 shows the interchangeable blow bushings and vent bushings on the inside surface of the magazine; Fig. 2 shows the outer face of the plate ready to be attached to the magazine.

We thought there would be trouble in holding the bushings in place, but it was found that the blow hole bushing is held in place by sand flowing through it, and the vent bushing is held in place because of a pressure differential that exists between the sand chamber and the box.

We first applied the idea to our 55 Demmler core blower. The sand chamber was redesigned to give us a greater capacity in the way of surface area and volume of sand.

The vented blow plate is so constructed that all of the 93 openings can be changed into either a vent or a blow hole. This gives any conceivable blow pattern that one would require for successful blowing. It gives us a universal blow plate and effectively eliminated the cost of individual blow plates.

An interesting method of matching the corebox to the blow plate is shown in Fig. 3. It involves a piece of plexiglas that is the same size and shape as the blow plate, with holes in it corresponding to all the bushing holes in the blow plate. All the holes are numbered to correspond to the numbering on the blow plate, and are ½-in. in diameter, which is the smallest blow hole diameter that we use.

Openings Plugged with Stoppers

Also shown is a jig with which the first blow pattern is laid out. The boxes are placed as one wishes under the transparent plexiglas and the desired blow hole openings in the plexiglas are plugged with stoppers to give a visual blow pattern. As shown in Fig. 4, the guide plate which locates the box in the blower is laid in the slide. This plate has two sharp pins to permit the corebox to be attached to it by pressing the top of the box. Then the position is traced and a permanent guide plate, as shown in Fig. 5, is attached to the box with a minimum of expended time.

The desired blow holes are enumerated on the side of the corebox and the coreroom foreman can then match the desired blow pattern at will. The remaining bushings are vent bushings. We have found some of our boxes actually have more vented area than they would ordinarily have with vents located in the corebox.

This equipment removes the tendency to economize on blow plates by making one permanent blow plate do for many jobs to which it is not adapted. Along with it disappears the occasional soft core that can result from such a practice. We have been able to blow cores that are superior to any blown before, and the time required to change the plate is very little more than changing the solid blow plates. The time could be made the same by having a second plate available to change the blow pattern beforehand. Venting of coreboxes was cut to a bare minimum with a decrease of approximately 90 per cent in box venting costs. So far we have found nothing but advantages for this type of a plate.

. . . if you sell it to the foundries

54th ANNUAL FOUNDRY CONVENTION and EXHIBITION in CLEVELAND - MAY 8-12

The coming gathering of the foundry "clan" promises to set new highs in attendance —and, more important, interest in new machinery and equipment, improved materials and supplies.

That interest has been generated by the general improvement in the demand for castings during the past few months and by the need for a continued drive for lower production costs. Foundrymen look for many more months of rising demand. In fact, an independent study of trends, over the next ten years, provides a sound basis for estimating that the record production of 16,000,000 tons of castings produced in 1948 will be exceeded many times before 1960.

Small wonder that foundrymen are on the hunt for machinery and equipment that will provide more efficient and economical operation, increase production of castings and improve their quality.

On top of that, speeded up operations in the foundries will accelerate wear and obsolescence, creating a replacement market of ample proportions.

If you intend to exhibit at the coming show, well and good. But whether or not, you will be sure of getting an attentive and receptive audience of 35,000 foundrymen for your sales messages in THE FOUNDRY. It reaches all those in key positions—executive, production and technical—who have a hand in purchasing foundry equipment, materials and supplies.

Two Outstanding Issues of THE FOUNDRY Devoted to Convention and Show Activities

The Pre-Convention Issue for May

This great issue of THE FOUNDRY will preview the convention, giving the highlights of this important week and a complete program of the show and technical sessions. This will be in addition to the regular features and technical articles—making the issue doubly valuable to foundrymen. It will be published well in advance of the opening of the convention. If you are exhibiting, make them want to see your new developments at the show. If not, you can't afford to miss this opportunity of showing your wares in THE FOUNDRY which will be distributed at the show.

Forms Close for May Issue on April 1st.

The Post-Convention Issue for June

Another great issue which will contain, in addition to the regular editorial matter, a comprehensive and interesting story of the convention and show. It will interpret what happened in terms of benefits to all foundrymen whether or not they attended the show. It will be a grand opportunity for you to cash in on the foundrymen's interest in what advances in their industry have been made and what are planned. With their enthusiasm whipped up, they'll be ready to buy. Make sure your products are on the preferred list by using THE FOUNDRY Post-Convention Issue.

Forms close for June Issue on May 1st.

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A Penton Publication, Penton Building
Cleveland 13, Ohio

By PAT DWYER

Drawings by RICHEY

ADVENTURES OF Bill

ONE night last fall," Bill said, "while taking a leisurely gander through the evening paper, I came across a letter written by the editor. A brief note in italics, presumably by the first helper, explained that this was one of a series written by the editor during a holiday tour of Europe. 'Twas a nice bit of descriptive writing, but what I liked about it particularly was that his views on certain subjects coincided exactly with mine."

"That priceless bit of information, the tendency to admire those who hold views similar to our's, has been common knowledge 'Far back beyant the days of Brian Boru!,'" I replied. "Instances are not unknown of foxy individuals who capitalize on this tendency and thereby materially increase their financial and social standing.

"On the other hand, practically every person resents a contrary opinion, whether expressed in words, a gesture, showing of the teeth, a shrug of the shoulder or the lift of an eyebrow. Instinctive dislike and further lack of confidence depend to a great extent on accompanying conditions. Lusty blows have been struck, guns have blazed and long knives have whizzed through the air over issues which to the ordinary observer did not amount to a pinch of snuff. Only a comparatively small number of people have the moral stamina to line up with Voltaire in his famous statement: 'I bitterly resent your opinion on this subject, but I maintain to the death your right to hold that opinion.'"

"Before you ramble away too far and get lost in the bushes," Bill said, "you might bestow a stray thought or two on the feelings of the honest lad, for instance the present speaker who volunteers a plain and simple statement. This plain and simple statement is snapped up by the party of the second part and then painfully twisted and distorted until the party of the first part does not know whether you are coming or going. Instead of spreading your stumpy wings and flying off on a wild goose chase, you should have cocked a polite and attentive ear and asked me to go into a little more detail on the editorial views that coincided so nicely with mine."

"Consider the ear, both ears, cocked at a respectful angle. You may fire when ready Gridley."

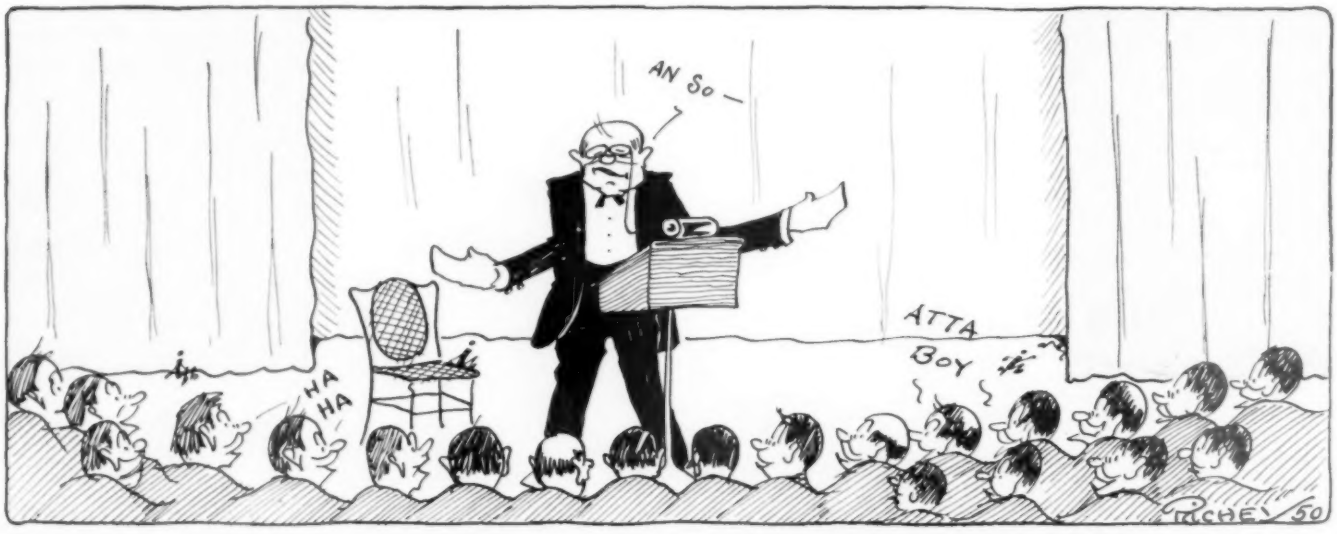
"Where does this guy Gridley come in? You can take him and Voltaire and any other stray characters that come to mind, and leave them out in the wood shed, or hanging on the line until this session is over.

"While prowling around Paris this editorial fella visited the tomb of Napoleon, one of the most ornate and magnificent sights in a city noted for points of interest. A short distance away he saw a modest statue erected to the memory of Louis Pasteur. He could not help commenting on the peculiar twist of human nature which prompted the building of such a costly memento to a destroyer, while according comparatively scant recognition to a man who conquered certain diseases and who probably saved more lives than were destroyed by the man whose remains rest in imperial splendor."

"You and your editorial friend are not the only people who have felt the same way in the presence of Napoleon's tomb. Stand by for a moment while I root around in this book case for *Selected Speeches of Robert G. Ingersoll.* On certain subjects my views are in direct opposition to those held and promulgated by the late Robert G., but with others I am in perfect and enthusiastic agreement. A written or printed speech lacks many of the features that render the spoken word such a delight to the ear. One misses the warm magnetic personality, the rolling organ tones, the flashing eyes and compelling gestures, the nicely chosen and scholarly language, and the mysteriously created atmosphere that prompts you to throw your hat in the air and shout."

"Well," Bill said, "you do not need to shout at me. I heard you the first time. Take a long breath and let's

(*Continued on page* 182)



"O, wad some power the gifties gie us to see oursel's as ithers see us." A quotation son!

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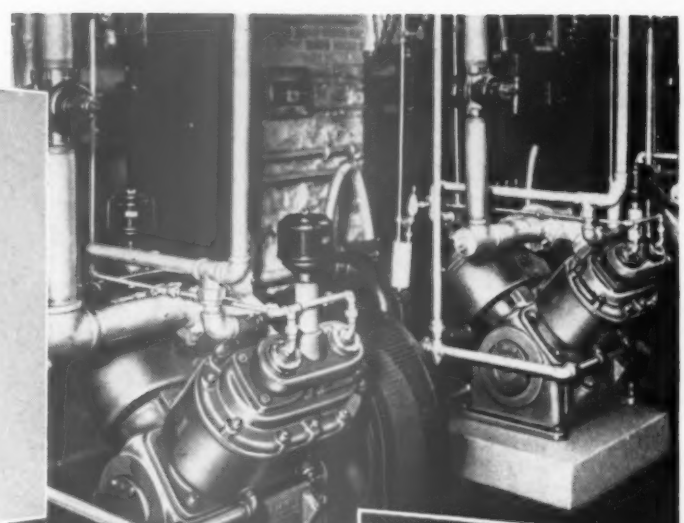


Plant after plant is turning to Curtis Air Hoists and Cylinders for pushing, pulling, lowering or lifting operations . . . and to multiple installations of Curtis Air Compressors, which eliminate long air lines, the possibility of air leaks, and losses resulting from breakdowns of central air compressor installations.

Here's why it will pay you to consider CURTIS *equipment*

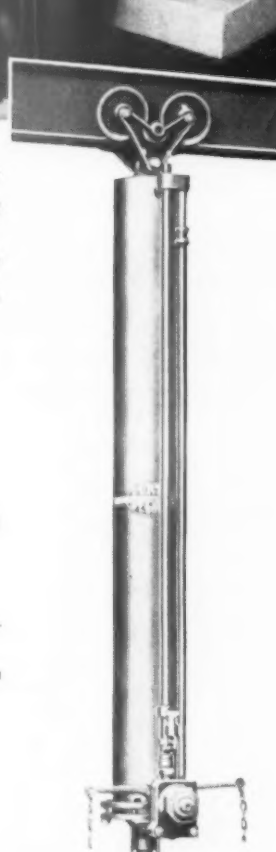
AIR HOISTS AND AIR CYLINDERS

- Cannot be overloaded.
- Hoisting or lowering speed is controlled by operator.
- Ground-steel cylinder.
- Disc type valves.
- Valve automatically returns to vertical position when released.
- Can be operated by unskilled labor.

AIR COMPRESSORS

- Timken-Bearing equipped—permits external adjustment.
- Self oiling—positive lubrication.
- Precision construction throughout.
- Complete valve assembly removed or replaced in a few moments.
- Cylinder, crankcase, also heads made from gas-tight iron.
- Fully enclosed.

Curtis bracketed-type Air-Hoist Cylinder can be placed in any position from horizontal to vertical.



Curtis Pendant Air Hoist can be used for practically any lifting problem where the head room is not limited.

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For screening Moulding and Core Sands, Medium Fine, Coarse and Sticky Materials, Type "V" with 20" sieve can do the work of 10 men—Type "V5" with 36" sieve, the work of 30—and all at a power cost of less than 1c an hour!

Type "V" Complete $225.00
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GREAT WESTERN MANUFACTURING CO.
LEAVENWORTH, KANSAS, U.S.A.

(*Continued from page* 180)

hear what the old war horse had to say. You may omit the gestures and all that kind of stuff. The less said about the magnetic personality and the rolling organ tones, the better, if you get what I mean dearie."

"All right," I said. "Brace yourself. Here she comes!"

A little while ago I stood by the tomb of the first Napoleon, a magnificent tomb of gilt and gold, fit almost for a Deity dead. Here was a great circle, and in the bottom there in a sarcophagus, rested at last the ashes of that restless man. I looked at that tomb and I thought about the career of the greatest soldier of the modern world. As I looked in imagination I could see him walking up and down the banks of the Seine contemplating suicide. I could see him at Toulon. I could see him at Paris putting down the mob. I could

Isn't television wonderful, my dear?

see him at the head of the Army of Italy. I could see him crossing the bridge of Lodi with the tricolor held aloft in his hand. I saw him in Egypt fighting battles under the shadow of the pyramids. I saw him return. I saw him conquer the Alps and mingle the eagles of France with the eagles of Italy. I saw him at Marengo. I saw him at Austerlitz. I saw him in Russia where the infantry of the snow and the wild blast smote his legions, where death rode on the icy wings of winter.

I saw him at Leipsic; hurled back upon Paris; banished; and I saw him escape from Elba and retake an empire by the force of his genius. I saw him at the field of Waterloo, where fate and chance continued to wreck the fortunes of their former king. I saw him at St. Helena with his hands behind his back gazing out upon the sad and solemn sea. And I thought of all the widows he had made, of all the orphans, of all the tears that had been shed for his glory. I thought of the woman, the only woman who ever loved him, pushed from his heart by the cold hand of ambition.

As I gazed, I said to myself: I

would rather have been a French peasant and worn wooden shoes, and lived in a little hut with a vine running over the door, with the purple grapes growing red in the amorous kisses of the autumn sun—I would rather have been the poor French peasant, to sit in my doorway, with my wife knitting by my side and my children upon my knees with their arms around my neck—I would rather have lived and died unnoticed and unknown except by those who loved me, and gone down to the voiceless silence of the dreamless dust—I would rather have been that French peasant, than to have been that imperial impersonation of force and murder who covered Europe with blood and tears.

"Great stuff," Bill admitted. "Consider all my former comment and so forth expunged from the record. If the other speeches are up to the same standard, I wish you would lend me the book for a month or two. I don't read very fast, and between one thing and another I have not a great deal of time to indulge in the pleasure of reading. For example, tonight or tomorrow I shall spend some time writing an answer to an inquiry from a young lad on the subject of plumbago as a mold coating. Here is the inquiry, original spelling and all.

I am benefited much by reading the Questions and Answers column in your monthly foundry magazin and hence I will appriciate very much if you could kindly give me solution to the following problem at your earliest convinence. In most of the gray iron foundries Plumbago mixed with water is used as a coating material. This mixture is agitated by a constant stream of air, which keeps the mixture in suspension and also serves to uniformly coat the mold. Plumbago in itself is not adhesive, hence it needs a binder to have a good spraying mixture for the mold. So I would be very thankful to you, if you would send me the name and the kind of binder used for the above purpose.

"Following is a rough draft of what I intend to write this pilgrim seeking the light."

Please accept my congratulation on very creditable performance in what apparently is not your native language. Your name, of ccurse, is a further indication that English was not the language used in your father's house. In our capacity as a venerable gray beard actuated by the most friendly motives, we might venture a guess that you never would be mistaken for Snow White's big brother, that you are a student, and that you are working in an American foundry for a short or long period with a view of becoming familiar with American foundry practice.

The first point to which your attention is directed is the importance of seeking information only from those competent to give it. This applies to what you read, or to oral in-

HOT OFF THE PRESS . . . NEWS OF IMPORTANCE TO BUSINESS EXECUTIVES

DAY AFTER DAY, new and profitable uses are found for CLARK fork-lift trucks and industrial towing tractors. Top flight operators, materials handling engineers and other plant officials, continue to develop applications for these machines that make them mobile "gold mines." Almost without exception, such new uses are as valuable to others as to their originators.

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formation. Short references may be accurate, but in the majority of instances, a great deal of supplementary reading is necessary to get a proper grip on the subject. On the subject of imparting oral information, the ordinary workman can give practical instruction on how to handle the tools and on how to make a mold. In many instances his knowledge of the purpose, source and composition of raw materials either is lacking altogether, or is of a hazy or mistaken character. Apparently you have picked up some of this kind of information already.

Item 1.—In most of the gray iron foundries plumbago mixed with water is used as coating material. The mistake in that statement is that pure plumbago is not used in most foundries. In others it is used in the dry form. Where it is used as a wash, applied with a spray gun, brush or swab, it is combined with a greater or lesser amount of ground coke or coal, a certain amount of clay and an additional binding agent in the form of molasses or other type of water soluble binder.

Item 2.—This mixture is agitated by a constant stream of air, etc. Where the amount is small the ingredients are prepared in a pail or swab pot. Where large amounts are needed, the mixture is prepared in a tank or pot where the contents are kept in motion by a two blade horizontal paddle attached to a revolving vertical shaft. After each addition of new material a baume reading is taken and adjustment made if necessary.

Item 3.—Plumbago is not adhesive, hence it needs a binder, etc. While plumbago is not adhesive, the material furnished by manufacturers who cater to the foundry industry, contains a certain amount of clay. Manufacturers of foundry facings, alert to foundry needs, have devoted a great deal of time and attention to the composition of mixtures most suitable for various classes of castings. They are reputable people, and a foundryman in doubt can rely on their recommendations.

Item 4.—Send me the name and the kind of binder, etc. In the early days of the foundry—and occasionally down to the present day—sour beer was used as a binder. Its virtues are still upheld by some tottering members of The Boys of The Old Brigade. You probably will have little or no opportunity to gain a first-hand impression. As with all or nearly all products, the manufacture of beer has been raised to a high state of perfection. A beer maker possibly—although not probably—might offer his right eye for sale, but certainly

(*Concluded on page* 186)

Just off the press...

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Here's basic information about aluminum casting alloys from Federated Metals, first in the non-ferrous field.

In simple, easy-to-read style it tells how to pour . . . how to avoid shrinkage, excessive dross, cracks in castings, gas absorption . . . how aluminum casting alloys are affected by copper, silicon, magnesium, manganese, iron, zinc, nickel, titanium . . . solution treating . . . aging . . . stress relief . . . corrosion . . . and test bars . . . all thoroughly covered.

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Send me a copy of Aluminum Casting Alloys.

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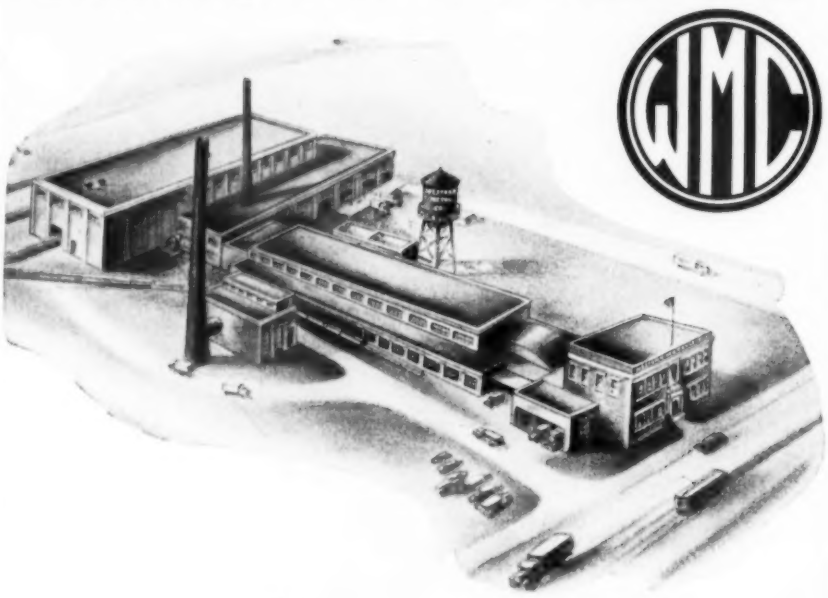
Company Name .....
Street .....
City ..... Zone ..... State .....
Title .....

F

Federated Metals Division

American Smelting and Refining Company, 120 Broadway, New York 5, N. Y.

CAPACITY TO SERVE!



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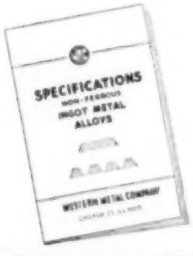

WRITE FOR NEW BULLETIN "F"

The foundryman not only must produce quality castings but he is faced with the problem of giving prompt service while keeping his metal inventory at a minimum.

By using Western Metal Co.'s "special delivery" service you are assured of highest quality ingot in the shortest possible time. LET US CARRY YOUR INVENTORY. Phone or wire for immediate delivery from our complete warehouse stock.

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WESTERN METAL COMPANY

Smelters and Refiners of
Brass and Aluminum Ingots

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(*Concluded from page* 184)

he would not advertise the fact that occasionally he had a barrel of sour beer on hand. No reliable documents are available, but tradition claims that the thirsty Old Boys for a small financial consideration, occasionally persuaded the great hearted beer wagon driver to leave a keg of the STUFF uncontaminated. This mysteriously vanished the first day.

At present the usual binding agent is molasses, a cupful to a pail of water, or any vegetable substance with adhesive qualities. The soluble vegetable resins in the waste liquor from pulp mills, neutralized and concentrated, are employed extensively. These materials are available from the manufacturers, or from foundry supply houses whose names and addresses appear every month in the advertising pages of THE FOUNDRY. As a source of detailed and accurate description you might look up the chapter on foundry raw materials in the late Dr. Moldenke's *Principles of Iron Founding.*

Book Review

A History of Steel Casting, prepared under the direction of William H. Worrilow and edited by Arthur D. Graeff, cloth, 168 pages, 6 x 9 in., published under the auspices of district No. 1, Steel Founders' Society of America. Price, $2.50.

To those interested in the development and progress of an important industry, the work of the committee from district 1 of the Steel Founders' Society of America renders a distinct service. This interesting volume gives a brief discussion of the general history of the ferrous foundry industry, reports on the origin of steel castings both in Germany and in the United States, and includes a primer of steel casting production.

Because 23 of the 35 steel foundries which are associated in district No. 1 are located in states which border the Delaware river, the second chapter of the book discusses the foundry industry along the Delaware. Tribute is paid to the leadership of the district, which has carried on down to the present time. This subject is treated further in chapter 5 in material prepared by J. H. Speicher and John Howe Hall.

Brief histories of the individual foundry companies in the district are included, as is a historical review of steel castings by W. B. Sullivan.

The committee preparing the work include William H. Worrilow, chairman, Newlin T. Booth, Arthur H. Jameson, G. Clymer Brooke, William T. Dunning, Daniel Eagan Jr., Jack Baldt, T. J. Birtwell, A. M. Andorn and Frank Briner.

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MALLEABLE FOUNDRIES, with cupola operation, are showing a rapid trend towards the use of Famous Cornell Cupola Flux. Reports of greatly improved casting production come from every direction. Furthermore, there is a considerable reduction in cupola maintenance labor and cost. The life of cupola lining, whether brick or stone, is greatly prolonged.

IMPROVE YOUR CASTINGS!

At negligible cost for material and labor, you can cut rejects amazingly by using—

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THE TIME-PROVEN METAL CLEANSER

Famous Cornell Cupola Flux removes impurities from molten iron, makes it hotter and freer flowing, slag is more fluid and sulphur greatly reduced. You pour castings that are sounder, cleaner, and the even grain and freedom from hard spots makes machining easier, smoother and faster. BIG SAVINGS are effected through reduction in make-overs. *Cleaner cupolas, cleaner drops, longer brick life* are other advantages in using this outstanding flux. Maintenance time and labor is comparatively nil.

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CLEANSES MOLTEN ALUMINUM so that you pour clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections can be poured. Castings take a higher polish. Exclusive Formula greatly reduces obnoxious gases, improves working conditions. Dross contains no metal after this flux is used.

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CLEANSES MOLTEN BRASS even when dirtiest brass turnings or sweepings are used. You pour clean, strong castings which withstand high pressure tests and take a beautiful finish. The use of this flux saves you considerable tin and other metals, and keeps crucible and furnace linings cleaner, adds to lining life and reduces maintenance.

Core and Molding Sands

(*Continued from page* 79)

up, and were thus deposited with the silica particles. In some parts of the Pacific coast, for instance, the beach sands contain so large a proportion of these minerals as to be black in color and only moderately refractory. Many attempts have been made to use them as sources of some of the scarcer metals they contain, but for molds they are far from satisfactory. Some sands, too, contain considerable amounts of unaltered feldspar or calcite which make them unsuitable for steel foundry purposes.

Steel casting manufacture in America originated in southeastern Pennsylvania, and naturally the industry turned to the almost limitless deposits of silica sand that cover so many square miles in southern New Jersey. In the early days, molds were invariably dried in ovens before the steel was poured, so it was not necessary to restrict the water content of the sands. By selecting certain portions of the south Jersey sand beds, a material was readily obtained that contained some 12 to 20 per cent clay or very fine silica particles, and 80 to 88 per cent silica, and for many years these naturally-bonded sands were standard in the industry.

To make them workable, the percentage of moisture was maintained at about 5 to 7 per cent and they were milled a few minutes in mixing machines of various types. A binder, such as molasses, generally was incorporated in the sand to give it greater cohesiveness when wet, but strength of the mold after drying was due chiefly to the clay content. Only the portion of the sand used as facing was prepared by milling, most of the mold being filled with heap sand from the floor. The molders "cut over" this sand with shovels and added water in proportions they considered necessary.

In European plants, molds for heavy steel castings have long been made of a manufactured refractory known as "chamotte," and of late years it has been used in a few American steel foundries as well. Chamotte is prepared from clays of high alumina content, which will endure exposure of liquid steel without much softening or incipient fusion. The clay is ground and then calcined by heating it above its softening point, so that it is partially fused and sintered into a hard mass. It is then re-crushed and mixed with 10 to 15 per cent of the raw clay; this bonds the sintered particles together.

Chamotte generally is not crushed to fine-particle size. Being a very "open" material, the voids between the grains are comparatively large and gases under pressure will penetrate the mold readily. Liquid steel, too, would enter the pores of the chamotte freely, so the mold surface is heavily coated with a slurry or wash of finely pulverized refractory material, usually chamotte. The molds usually are dried thoroughly before being poured, and in some cases are brought nearly to a red heat before introduction of the steel.

For many years, English steel foundries used a material similar to chamotte, known as "molders' compo," made from a mixture of raw clay, old brick-bats and old fireclay crucibles in which steel had been melted. Crucibles made of mixtures of graphite and clay, standard in America, were never adopted in England; the manufacturers of tool steel preferred to make their crucibles of various highly refractory clays. At least until quite recently, each shop produced its own pots on the premises, the workmen treading the moist clay with their bare feet to prepare it for shaping into crucibles.

The pots were generally used two or three times, and the clay was partially fused and thoroughly sintered by these repeated heatings to steel melting temperatures. The brick-bats and broken pots were crushed, screened and mixed with enough raw clay to give a good bond, the resulting material being closely similar to chamotte. Of late years, wide adoption of the electric furnace process has driven the crucible method of steelmaking almost out of existence, and with it went the supply of old pots for making compo. As a result, English steel foundrymen have been forced either to use various varieties of chamotte, or to turn to other materials.

Adopt Green Sand Molds

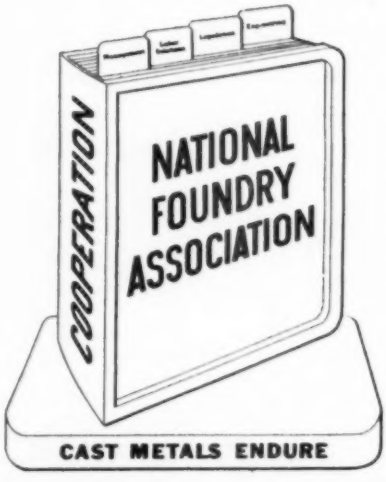
This change of practice occurred at about the same time the use of dried molds and naturally bonded sands in American steel foundries began to give way to the more modern practice of pouring steel into undried or partially dried molds made with artificially bonded sands. English foundrymen, therefore, have been in a position to benefit by the experience gained in this country in the use of what is broadly, though none too accurately, known as "green sand molding."

A suitable molding sand mixture must retain its shape when the pattern is drawn and the flask rolled over, and must permit patching of broken or torn areas. The sand must not wash away under the erosive action of the flowing metal. The sand must also remain in place on mold surfaces exposed to heat of the metal while the cavity is filling up.

As silica sand expands markedly when heated, the mold's side wall surface, especially that of the cope, tends to spall or slough off as the heat strikes it. Surface of the sand, of course, expands faster than the underlying layers, and hence first buckles and then breaks away completely. If the spalling occurs some time before the steel comes in contact with the mold surface, loose sand is carried along on top of the flowing mass of steel, giving lumps on the casting and dirty spots at other places, the same as when the

(*Continued on page* 190)

National Foundry Association Adopts Symbol



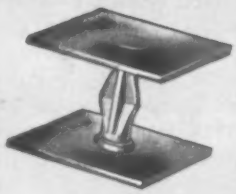
NATIONAL Foundry Association has adopted a symbol, reproduced here, to identify the work of the association in the foundry industry. The implications of the symbol are that on the firm foundation, "Cast Metals Endure," through co - operation under the direction of the NFA, the problems of management, labor relations, legislation and engineering will be solved and will comprise a record of accomplishment for the Association of Foundry Management. It is intended also that the symbol be a testimonial of the devoted and constructive work of American industrial leaders who have contributed their time and energy over the years.

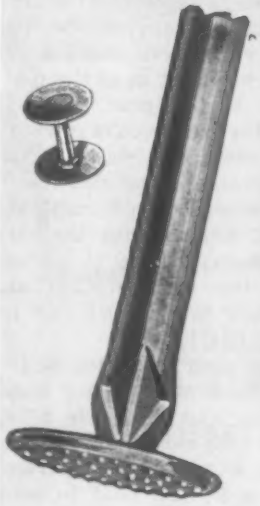
For Sound Castings

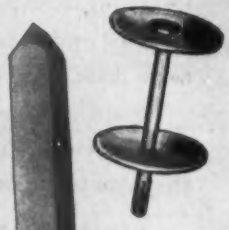
Important Notice:

Two motion pictures films—one on the use of Chaplets, the other on the use of Chills—are available, free of charge, for showing at Foreman Club meetings, in technical schools, A. F. A. chapter meetings, etc. Write for reservation.

FANNER CHAPLETS & CHILLS







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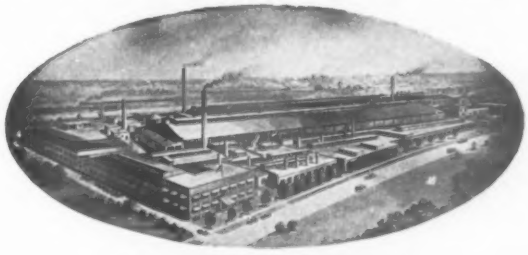

Birdseye view of the Fanner Brookside Park plant in Cleveland

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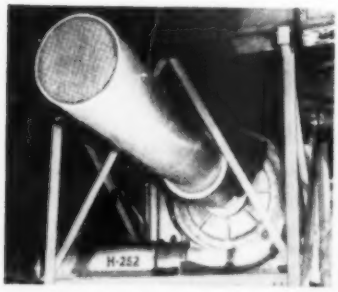

CENTRIFUGAL

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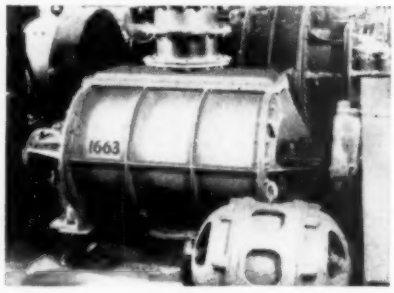
ROTARY



ROOTS-CONNERSVILLE

BLOWER BUILDERS R-C SINCE 1854

ONE OF THE DRESSER INDUSTRIES

(*Continued from page* 188)

sand erodes near the gates.

When surface sand breaks away just as the steel touches it, or a moment before that, the dislodged sand remains about where it falls. The steel then fills the empty space back of the loose piece of sand, and also covers it on the other side. The partially or completely buried fragment of sand then forms a scab on the surface of the casting. Whether the spalling results in a lump at one place and a dirty spot at another, or in a scab, depends upon whether or not the sand is detached early enough to be carried along on the surface of the moving mass of metal.

Need Refractory Sand

The sand mixture must also be refractory enough not to soften from prolonged contact with liquid steel. In heavy castings, which solidify and cool solwly, the sand is inevitably heated above its softening temperature, and kept there for a considerable time. This is not always too serious, however, since the chief result of the softening of the sand is that it tends to adhere to the casting. If extended exposure to high temperature occurs while steel is still being run in, however, as in the parts of the mold at and near the gate, softening of the sand results in greatly increased erosion or washing. Under these circumstances, the resulting sand inclusions may be mistaken for entrapped slag, because the sand is partially fused before it is torn away from the mold surface and looks something like particles of refractory slag.

Finally, the sand must not be impervious to the flow of the hot gases evolved during and after the filling of the mold. A certain amount of gases, chiefly hydrogen, nitrogen and carbon monoxide, are held in solution in the liquid steel, and liberated as it cools and solidifies. Presence of carbon monoxide may also be due to the reaction between carbon and iron oxide, FeO, in incompletely deoxidized steel. However, the greater proportion of the gases is formed in the mold material by heat of the liquid metal. Organic constituents in the sand are thus converted into various hydrocarbons, and probably also into hydrogen, carbon monoxide and carbon dioxide.

Water, either uncombined or present as water of crystallization in the clay, becomes steam and is, to some extent, dissociated into hydrogen and oxygen. That this dissociation takes place is shown by the fact that a few minutes after being filled with steel, molds composed only of sand,

(*Continued on page* 192)

"HAS INCREASED (Molders) PRODUCTION 30%"

CAST-RITE FOUNDRY & MACHINE WORKS
MANUFACTURERS OF
BRONZE, BRASS, ALUMINUM and NICKLE SILVER CASTINGS
MACHINE, TOOL AND PATTERN WORK
BRETT AVENUE - R R No. 2
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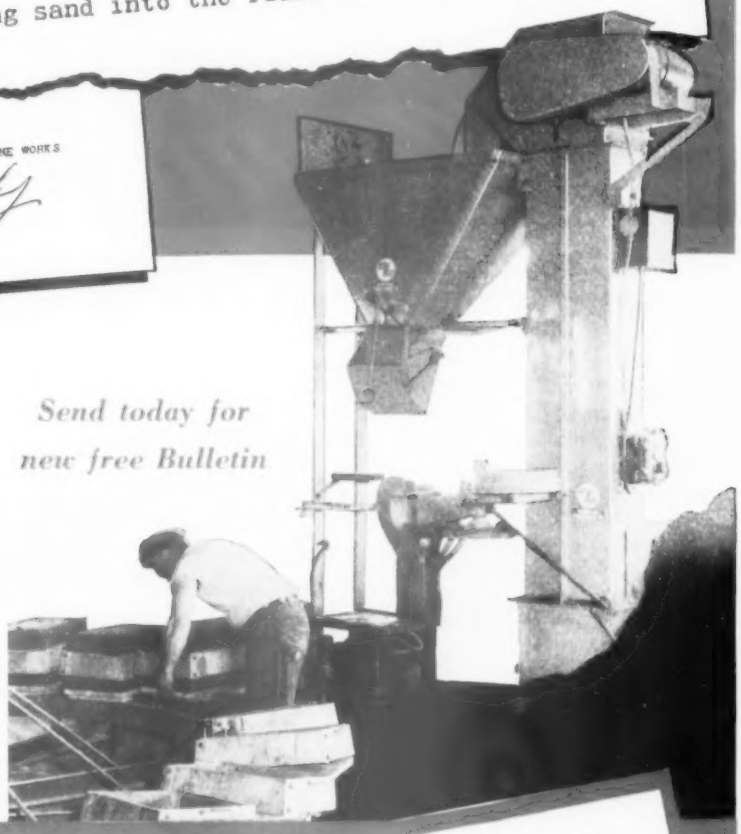
"We are well pleased with the results obtained from the 'Handy Sandy'. This unit has increased production by 30% on work in our shop and has consequently lowered our cost of operation. We find the cost of installation on this type unit negligible in comparison to a complete overhead sand system as each molding station can be progressively installed at a minimum financial outlay."

"The unit is used to eliminate the expensive handling of molding sand. We believe it to be the answer to many foundrymen's wish to eliminate the back breaking and expensive method of shoveling the molding sand into the flask from the floor."

Very truly yours,
CAST-RITE FOUNDRY & MACHINE WORKS

the new HANDY SANDY



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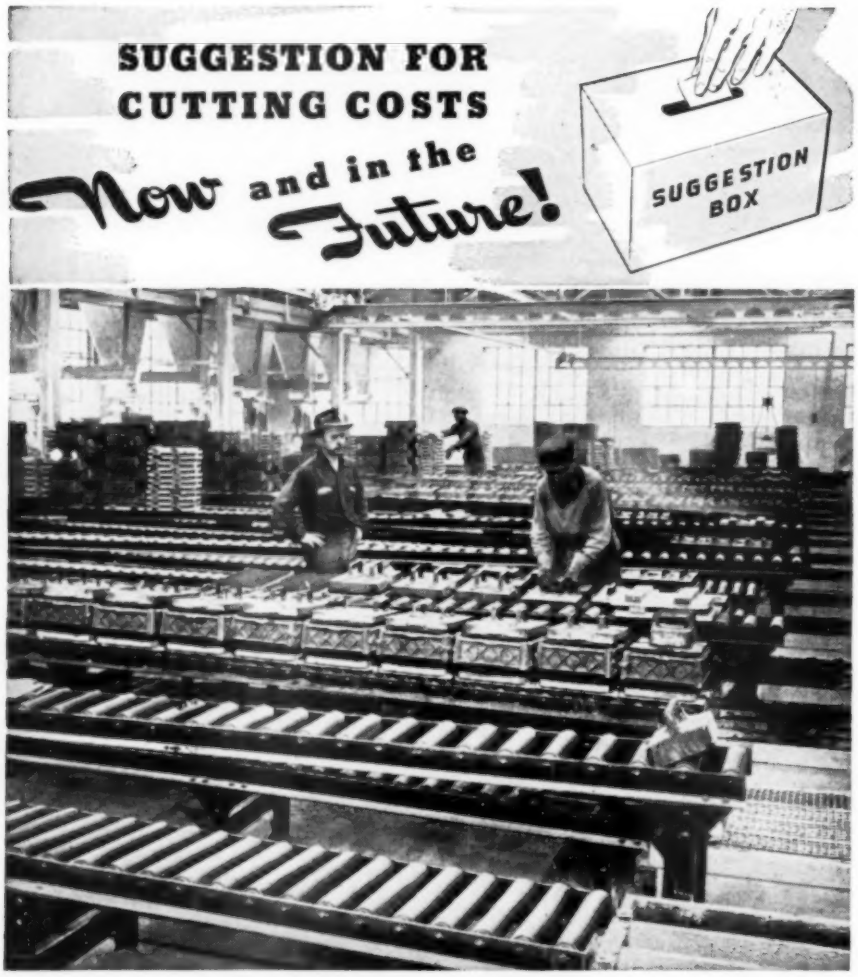

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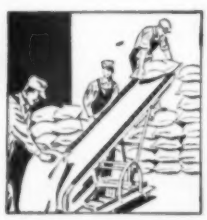

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(Continued from page 190)

cement and water evolve quantities of gas which escape through numerous cracks in the mold and burn with a pale blue flame. Obviously, this gas is hydrogen. The small amount of free water remaining in the cement-sand mixture, and the water of crystallization in the hydrated calcium and magnesium silicates and aluminates of which the set cement is composed, are the only possible source of this hydrogen. It is certain that free water in sand-clay mixtures, and the water of crystallization in the clay, react in the same way.

The volume of hydrogen and oxygen thus evolved is much greater than that of the steam from which they are derived. Being highly heated, they are under great pressure, and must escape into the mold cavity before the steel fills it, force their way into the fluid steel, or flow through pores of the sand and thus reach the outer surface of the mold. Portions of the evolved gases that find their way into the mold cavity before the steel fills it are of minor consequence, because they escape readily at the same time as the air in the mold cavity, through the heads and pop-offs.

Gases evolved from the sand after the mold is filled are quite another matter, since they must not be permitted to force their way into the steel and form pin-holes and blow-holes in the casting. When the steel is still very hot and fluid, perhaps a small amount of this gas can reach the heads and escape into the air, but the metal soon becomes too pasty to permit gas passage. As the only other path of escape is through the mold pores, it is vital that the sand be sufficiently open or permeable.

Sand Testing — Thirty years ago the foundryman judged the properties of a sand mixture by squeezing a sample in his hand and noting its "feel" and how firmly the compacted mass stuck together. The handful was sometimes slapped against a flat surface and the resulting cake broken between the fingers to judge its strength. The openness was guessed at chiefly by watching the castings for signs of excessive porosity. Today, various properties of sand are determined by standardized tests of various kinds.

After nearly 30 years of research and experimentation, it is still not possible to use with success in one foundry the exact sand mixtures that give satisfactory results in another plant, depending simply upon making the properties of the sand the same in both places. The tests, in

(Continued on page 194)

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(*Continued from page* 192)

fact, are still chiefly of value in ensuring that the sand mixtures used in a particular shop for a certain type of casting are the same or nearly so, day after day and batch after batch, so that at least one of the many factors involved in the production of satisfactory castings is kept reasonably constant. This is particularly true of tests to determine properties of sand mixtures at high temperatures. Evolved more recently than the standard methods of testing at atmospheric temperature, tests of the hot sand give results whose exact meaning and significance are not yet entirely clear.

By means of the tests previously referred to the foundryman seeks to keep certain definite characteristics of his sand mixtures as constant as possible. Properties of major importance are: 1. Strength—green, dry and hot. 2. Permeability—green, dry and hot. Of less importance are: 3. Flowability. 4. Deformation—green and dry. 5. Sintering point (allied to No. 4 in the next list).

Vary the Properties

These properties may be varied over wide limits by selecting sands of different inherent characteristics and by compounding them with different bonding materials and water. Inherent characteristics of the base sands are: 1. Grain shape. 2. Grain size and distribution. 3. Chemical composition. 4. Refractoriness. With given base sands, the desired properties in sand mixtures are obtained by varying: 1. Per cent moisture. 2. Nature of binder or binders. 3. Amount of binder or binders. 4. Time of mixing and type of mixer used.

The strength and permeability of molding sand mixtures largely determine the behavior of the sand in a mold. In atmospheric temperature testing of either dry or green sand, both strength and permeability are determined on a specimen 2 in. in diam and 2 in. high. This test piece is formed by compacting the proper amount of sand in a heavy metal tube, with a standard ramming device consisting of a rammer on which is mounted a 14-lb sliding weight which is raised and dropped exactly 2 in. The American Foundrymen's Society standards specify giving the test piece three rams which is thought to correspond roughly to the average degree of compacting of the sand in a mold.

The actual degree of ramming in a mold, either by hand or by machine, varies considerably from one part of the mold to another. Those made with sandslingers vary the least, but even they are not rammed to an absolutely uniform hardness. Since the sand next to the pattern is often packed tighter than that in a standard AFS specimen given only three rams, it is occasionally thought desirable to check the properties of specimens after being subjected to a greater number of blows of the rammer. Most routine sand testing, however, is done with the specimens given the standard three rams.

Both strength and permeability are determined either on the sand in the green condition, or after drying the specimen. Usually a drying time of one hour and a temperature of 221 to 230° F are employed. Properties of the sand after drying correspond roughly to those of a dry sand mold, or of the surface layers of a mold partially dried before closing and pouring.

Calculate Permeability

Permeability of the sand is calculated as the number of cubic centimeters of air under a pressure of 1 gram per sq cm that will pass through a specimen 1 sq cm in cross-sectional area and 1 cm high. The standard AFS method calls for forcing 2000 cc of air through a specimen 2 in. high and 2 in. in diam, by means of apparatus which keeps the air under uniform pressure in a chamber covered by a weighted dome. From the time required to pass 2000 cc of air through the specimen, the permeability is calculated.

In routine testing a quicker method is used, in which the air is forced through the specimen after passing through an orifice of a certain definite diameter, and the pressure of the air is read from a gage. The apparatus used has a movable scale that permits the permeability to be read directly, rather than reading the pressure and calculating the permeability. Orifices of two sizes are used, a larger one for fine-grain, tight sands, and a smaller one for very open mixtures. This method is less accurate than the standard one, but is used for almost all regular control work, the slower and more exact standard method being reserved for investigations in which even a slight error is undesirable.

The 2 x 2-in. AFS test specimen is used also for determining the strength of green or dry sand mixtures at atmospheric temperatures. In lifting and placing long cores, and to some extent in handling molds, the sand is subjected to tensile stresses. Possibly for this reason, the earliest experimenters determined the ability of a long bar of sand to resist bending, which of course sets up tensile stresses in the specimen's outer fibers. After a few years, how-

(*Continued on page* 196)

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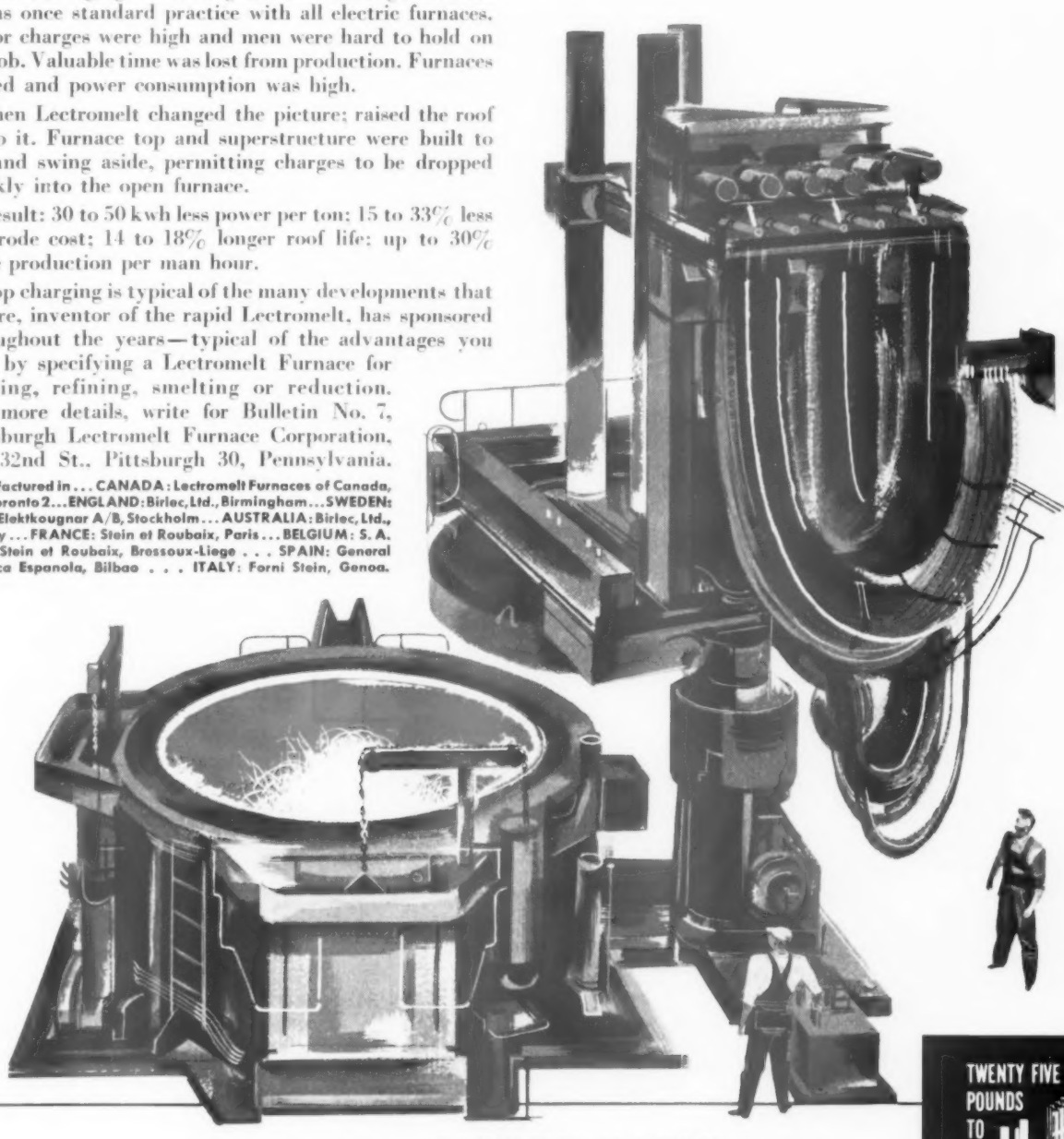

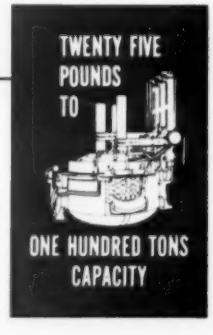

WHEN YOU MELT... MOORE RAPID *Lectromelt*

(*Continued from page* 194)

ever, this method was abandoned and tests made on the 2 x 2-in. specimen were adopted as standard. Generally the compressive strength or the compressive shear strength of the sand is the property determined.

Compressive strength is ascertained by loading the test piece uniformly over its end surfaces, steadily increasing the load until the specimen collapses, recording the maximum load supported, and calculating the compressive strength in psi. The procedure for determining green and dry strength is identical, except that the apparatus used is arranged so that higher pressures can be applied to dry sand specimens. Partly because many dry sand mixtures will support very heavy compressive load when the specimen is tested after drying, the compression shear test is sometimes subtituted for the plain compression test. The shearing strength is determined by applying the load to diametrically opposite halves of the flat faces of the test piece, and is calculated as the maximum load in psi endured along the axis of the selected test piece.

With special attachments, the tensile strength of either green or dry sand specimens can be determined with the standard 2 x 2-in. specimen. When this test is used, the tensile strengths of undried, green sand mixtures is reported in oz per sq in. of cross section of the specimen. Tensile test determinations of green sand mixtures, however, are of but little value to the foundryman and are seldom made.

When it is desired to determine the tensile strength of dry sands or of baked core sands, another type of test piece is generally used. As shown in Fig. 1 this specimen is shaped like those used in testing cement, and has a cross-sectional area of 1 x 1-in. at the thinnest portion. With special grips attached to the machine used for making compression and shear tests, this test piece is broken in plain tension.

Certain Tests Omitted

Flowability and deformation of molding sand mixtures are of less importance than strength and permeability, and are not usually determined in routine testing. Flowability is defined as the mobility of a sand by virtue of which it fills recesses and moves against pattern surfaces not necessarily in the line of squeezing or ramming. Several different types of equipment for determining flowability have been designed, but so far none has been accepted as standard. With the rammer usually employed to form the AFS standard 2 x 2-in. test piece, the flowability is sometimes considered to be the amount of decrease in length of the piece between the fourth and fifth drops of the weight. The decrease in length is measured by a dial gage.

Because flowability is often low when other desirable properties, such as green compression strength, are high, it frequently is not possible to adjust a sand mixture to secure maximum flowability without sacrificing more essential characteristics. Certain binders commonly used in sand mixtures increase properties generally considered more important, and decrease flowability.

Deformation is a characteristic of a sand mixture that has not yet been satisfactorily defined. First described by Dietert[1], it has been determined by measuring the amount in thousandths of an inch that the standard AFS compression test specimen shortens before it breaks. In discussing this property, Briggs describes deformation as the amount that a sand gives or yields before it breaks. Briggs says "a sand with low flowability which does not permit packing into

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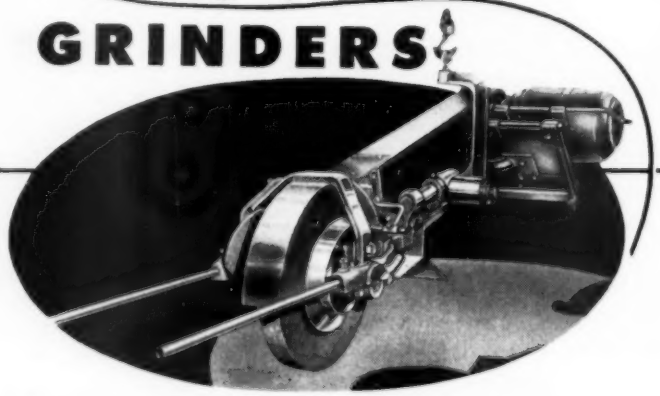

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a mold as hard as it should be, would cause excessive deformation under pressure from the molten metal. A sand of good flowability would give low mold-deformation values." This is practically the same as saying that if the sand is rammed tight, there will be little deformation, while in improperly rammed areas deformation will be high. As any foundryman knows, the mold will swell badly at points where, for one reason or another, the sand is not properly compacted.

Only in a general way can existing data on deformation be used to estimate the extent to which sand will be compressed by the pressure of steel in a mold. This is partly because, in most cases, deformation values are determined from test specimens given the standard three rams used for making the green compressive strength test, and the sand in molds is often rammed much harder. For another thing, the sand in a comparatively narrow test piece, loaded at the ends and entirely unsupported against lateral motion, will not behave in the same way as a large mass of sand held within a rigid flask.

Give Reliable Indication

Tests such as those used in determining the bearing power of soils would give a more reliable indication of what is likely to happen in a mold. These tests are made on a fairly large area of soil and in such a way that the tendency of the soil to flow sideways is restrained as it would be in the case of the ground under a foundation carrying the load of a column or a machine. Such conditions more nearly resemble those in a mold filled with fluid steel, than does a small test piece loaded at the ends and unsupported at all other points.

The sintering point of sand mixtures is the temperature at which the sands start to soften, and is the measure of refractoriness of most use to the foundryman. As this property is closely related to chemical composition of the sands and sand mixtures, it is covered in later paragraphs, in the discussion of the inherent characteristics of the base sands.

It is difficult, if not impossible, to determine the influence of such properties as tensile or compressive strength upon the behavior of the sand when the mold is filled with liquid steel. In the design of a building or a bridge, the direction and nature of the stresses in each member and the strength of the material are definitely known, so that by allowing a proper safety factor the en-

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gineer can proportion the parts to be sure they will successfully carry the imposed loads. In a mold, on the other hand, it is impossible to obtain definite knowledge of the conditions to be met.

Of course, it is obvious that if the compressive strength of the sand were too low, a deep mold would collapse in a heap under its own weight when the pattern is drawn. A certain minimum green compressive strength is therefore essential. Even this requirement is not absolutely necessary in all types of sand mixtures. Cement-bonded sands, for instance, have so low a green compressive strength that a deep core or mold will not stand up unless it is allowed to harden a little before the pattern or corebox is removed. The initial set of the cement begins so quickly that the sand soon becomes strong enough to hold its shape when unsupported.

When a mold is filled with liquid metal, the tensile stresses set up would generally be high enough to burst it, were the sand not given outside support. Some small snap-flask molds may be poured without jackets, but this is the exception rather than the rule. In larger molds a flask or corresponding supports are essential to resist the tensile stresses caused by ferrostatic pressure of the steel. As explained previously in the section on flasks and rigging (January and February, 1950), these stresses can readily be calculated.

Compressive strength of the rammed sand is usually high enough to resist the pressure of the fluid steel which tends to compact the sand against the flask and so to enlarge the mold cavity. This would not always be shown by a calculation based upon the AFS compression strengths. For instance, ferrostatic pressure on the walls of a mold at a depth of 5 ft below the surface of the fluid metal is approximately 15.5 psi and this is considerably above the AFS compressive strength of most undried sands. However, in a mold of this depth the sand would always be rammed tighter than a test piece given only three rams, and therefore would have a considerably higher compressive strength.

Molds are Dried

As determined upon the unsupported AFS test piece, too, the compressive strength is not a direct measure of the behavior of sand rammed tightly into a strong flask, and supported on all sides. Also, molds as large as this are always either air dried or skin dried to a depth of several inches, thereby raising the compressive strength above that of freshly prepared sand. A properly made green sand or skin-dried sand mold, therefore, will seldom swell seriously. When regular dry sand practice is used and the mold completely dried, swelling is almost out of the question.

It is practically impossible to interpret properties of sand in terms of its resistance to washing and erosion of fluid steel, the tendency of the surface sand to slough off before the steel comes in contact with it, its resistance to softening and "burning on" the steel and to penetration of the sand by steel, etc. In fact, definite knowledge of how some of these things occur is still lacking and authorities are not in agreement as to the cause of many of them. Even the degree of permeability required in facing and backing sand to allow gases to escape from molds of different sizes and shapes is not definitely known. Cases are on record where the permeability of the sand in direct contact with the steel at many points of the mold

(*Concluded on page 200*)

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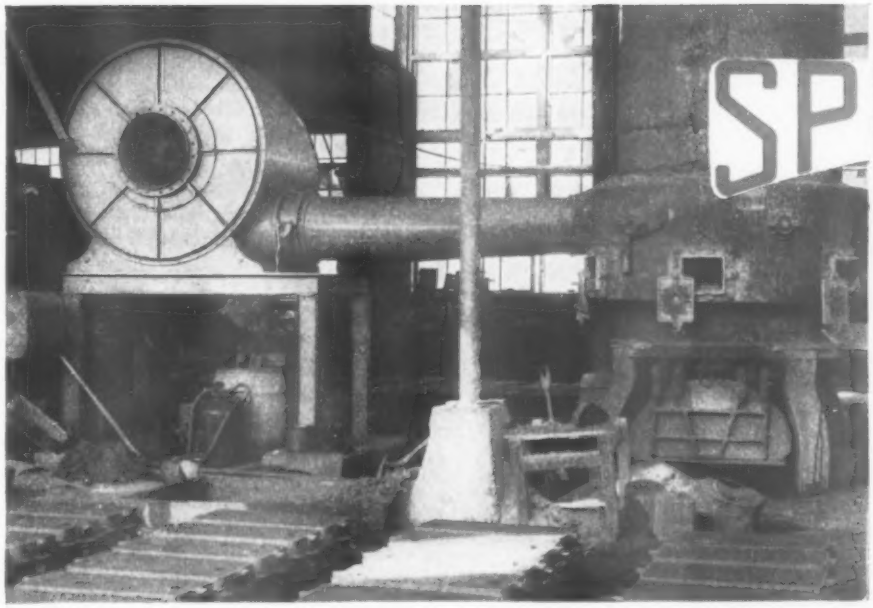

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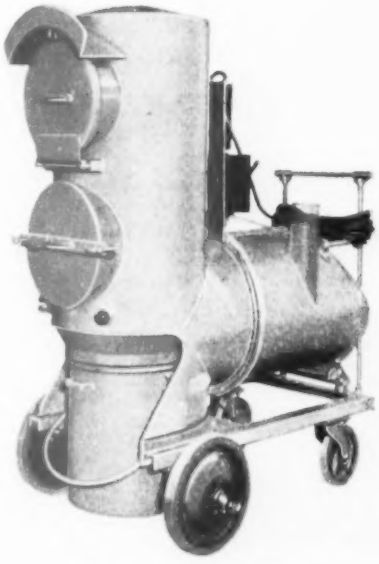

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(*Concluded from page* 198)

was practically zero, yet sound castings were secured. In such cases, this was generally because the permeability of the backing sand was high enough to carry off the gases generated in the mold, and the tight facing did not contain enough moisture and volatile constituents to cause the surface layers to be blown off by suddenly generated gases.

To repeat, the chief value of tests of sand at normal temperatures is to be sure that its properties are kept reasonably uniform, so that if other conditions do not vary too much, satisfactory castings will be produced.

A few years ago it became evident that, to better understand the behavior of sand in molds, tests should be carried out at high temperatures, and apparatus in which to make these tests was developed. Because of the high cost of a machine large enough to use the standard AFS compression test piece, a smaller and less expensive design was adopted, and almost all information on properties of sand mixtures at high temperatures has been obtained with this apparatus on test pieces of smaller size. Unfortunately, it has not been possible so far to secure close correlation between tests made on the smaller specimen and what few have been carried out in a larger piece of apparatus. In fact, no two laboratories using the same apparatus and testing identical sands prepared at one place and kept in sealed containers, have been able to secure identical results on any one sand mixture. None of the high-temperature test methods has yet been adopted as standard.

Properties determined in high-temperature testing are compressive strength, expansion and contraction, resistance to suddenly applied temperature (spalling and cracking), and sometimes the rate of gas evolution and the amount of gas evolved. The procedure for testing the resistance to suddenly applied high temperatures has been the same in nearly all experimental work. With the furnace at full temperature, generally 2500° F, the specimen is quickly put in place, and held in the furnace for a definite length of time, then removed and allowed to cool. With some sand mixtures, the test piece will crack in one or more places, or parts of the outer skin will spall off. Other mixtures may show no signs of cracking or spalling.

Measure Expansion

Expansion and contraction of the sand when heated is measured with fair accuracy by means of a rod of low-expansion material that rests upon the top of the specimen and actuates a gage reading in thousandths of an inch. Readings are taken at regular intervals, usually every 15 seconds, until the maximum expansion has taken place, then every 30 seconds for recording the contraction that occurs in certain mixtures. Results are reported in thousandths of an inch per inch of sand.

Compressive strength at high temperature is determined by subjecting the test piece to steadily increasing load and observing the maximum stress sustained before the sand collapses. Usually, in order to make sure that the entire piece has reached the desired temperature, the specimen is held in the furnace a definite length of time before applying the load. Hot strength is recorded in psi just as in atmospheric temperature testing.

(*To be continued next month*)

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1. H. W. Dietert and Earl Woodliffe, "Measure Deformation of Molding Sand," THE FOUNDRY, September, 1939, page 28.
2. Charles W. Briggs, *The Metallurgy of Steel Castings*, McGraw-Hill Book Co., first edition, page 369, line 38.

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RADIATOR Section Molds

(*Continued from page 75*)

The operator uses a piece of flat steel plate 4 x 6 in. and equipped with a handle. This gadget bears a strong resemblance to the tool used by the workmen engaged in putting the finishing touches on a cement sidewalk. The coremaker slides the plate along at a slight angle to press the sand into the corebox. Then the same tool is employed as a strike to remove the surplus sand.

A vent passage is formed in the exposed face of each half core. A flat steel plate equipped with suitable guides at the ends, and with half rods 3/16-in. diam brazed or welded to the face of the plate in the required position, is pressed down in turn against the exposed face of each half core. The projecting members on the face of the plate form shallow vent grooves in the sand. A small plunger near one end is struck a light blow to drive a vent hole through the boss which forms the nipple opening near the end of the casting. The vent from all the smaller passages passes through this opening and out through a vent hole in the cope half of the mold when the core is surrounded by molten iron.

The two half coreboxes are turned up on edge, face to face to bring the half cores into intimate contact. The process is known in the foundry as booking. Then the assembly is lowered back on to the bench and the upper half box is removed. The entire core remains in the other half box which serves as a support or drier shell while the core is going through the oven. Thus one half-box remains in constant use as a corebox, while the other half is one of a long line that doubles as corebox and drier shell. Even though you are an exceptionally fast reader, the coremaker will have placed half a dozen cores on the rack while you have been reading the foregoing three paragraphs.

Cores are dried in two 2-oven batteries, fired with gas and equipped with a circulating system that maintains a uniformly high temperature that bakes each batch of cores in 1½ hours. Cores loaded on high racks are carried into and out of the ovens by lift truck.

Iron for the castings is melted in one of a pair of twin cupolas, 55 in. inside diameter and operated to melt approximately 100 tons per day. The cupolas are outside the building facing the raw material yard. The spouts project through the wall to discharge molten metal into a reservoir ladle inside the building. Iron and slag flow continuously. A brick dam in the spout permits the iron to flow through but holds the slag back to be discharged through an opening in the side of the spout wall. A small auxiliary spout conducts the slag into a circular steel container suspended from a thrust bearing and filled with water. The stream of water from a tap keeps the container in motion and also granulates the slag. When the container is filled it is removed and replaced by another unit.

The raw material yard which parallels one side of the building is spanned by an electrically-operated traveling crane which does nearly everything including making up the charges in steel charging buckets. The material is placed in the cupola by a jib crane which can swing to serve either melting unit. The buckets hold 1600 lb iron, 200 lb coke, and 70 lb limestone.

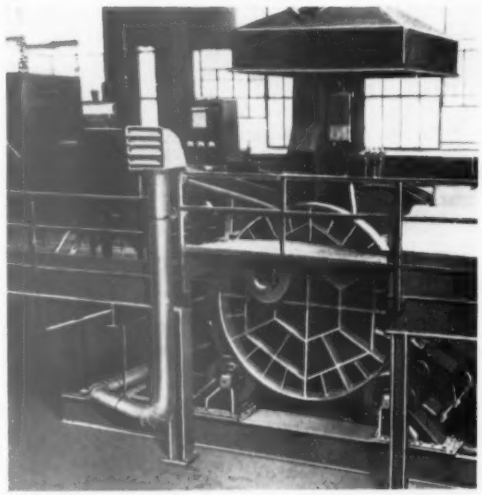
Cupola charges are approximately uniform from day to day and include

Scovill installs WORLD'S LARGEST AJAX - SCOMET Electric Induction Furnace

FOR faster melting, lower melting losses, close temperature control, and complete dependability in quality results, Scovill Manufacturing Company chose the 1000 KW. Ajax-Scomet Electric Induction Furnace for its new plant. It is the largest and most powerful electric melting furnace ever made for brass.

Holding capacity is 20,000 pounds, with an hourly melting rate of 5½ to 6 tons. Under controlled conditions, molten metal is supplied to continuous casting machines for the production of brass strip of unprecedented size.

Ajax engineers bring you over thirty years' experience in the induction melting field. Ajax-Scomet Electric Induction Furnaces offer distinct advantages in cost reduction and manufacturing efficiency.



One of three 1000 KW. Ajax-Scomet Electric Induction Furnaces, for melting brass, recently installed at Waterbury, Connecticut for the Scovill Manufacturing Company.

AJAX ENGINEERING CORPORATION Trenton 7, New Jersey

AJAX TAMA-WYATT INDUCTION MELTING FURNACE

Associate Companies: AJAX METAL COMPANY, Non-Ferrous Ingot Metals and Alloys for Foundry Use
AJAX ELECTROTHERMIC CORP., Ajax-Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax-Hultgren Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax-Wyatt Induction Furnaces for Melting

40 per cent pig iron, 35 per cent domestic sprue, gates and scrap, and the remainder purchased scrap. Average analysis of the castings shows total carbon 3.40 per cent, combined carbon 0.55 per cent, silicon 2.35 per cent, sulphur 0.100 per cent, manganese 0.65 per cent, phosphorus 0.45 per cent.

The 24 in. semiautomatically operated, push-button controlled molding machines and the flask indexing equipment employed in the two units were supplied by the Wm. H. Nicholls Co. Inc., Richmond Hill, N. Y. Other major suppliers of equipment are as follows: Sand system, Jeffrey Mfg. Co., Columbus, O.; mold conveyors, Mathews Conveyer Co., Ellwood City, Pa.; shakeouts, Robins Conveyor Division, Hewitt-Robins Inc., Passaic, N. J.; sand mixers, Clearfield Machine Co., Clearfield, Pa.; cranes and cupolas, Whiting Corp., Harvey, Ill.; automatic limit switches, National Acme Co., Cleveland; automatic air controls, Logansport Machine Co., Logansport, Pa., and Hannifin Corp., Chicago; timing devices, Ross Operating Valve Co., Detroit.

"These Core Plates Handle Easily"

TRANSITE CORE PLATES are lighter, stronger, resist warpage.

Core makers can handle more Transite Core Plates at one time, thus make fewer trips. That means faster production with less fatigue and fewer accidents.

Transite Core Plates Last Longer—Made of fibrous asbestos and cement, they resist shock . . . are less likely to crack or break.

Clean Easily—Core wash, sand, etc. do not stick as readily as to other materials. Both sides are usable.

Resist Corrosion and Warpage—Surfaces stay smooth even after long service. Warpage is less than 0.1%.

Economical—Low price, low maintenance and long life add up to low cost.

To eliminate green cores and reduce baking time perforated plates are also available.

For full details, write Johns-Manville, Box 290, New York 16, N. Y.

JM PRODUCTS

Johns-Manville TRANSITE CORE PLATES MADE OF ASBESTOS

MIT Offers Special Training Courses

Massachusetts Institute of Technology, Cambridge, Mass., will offer two one-week specialized training programs in instrumental analysis July 10-14 and July 17-21. The first week's program will be devoted to electrical methods of instrumental analysis and will emphasize potentiometry, polarography, conductimetry, amperometric titrations, and applications of self-balancing recording potentiometers.

Optical methods of instrumental analysis, including spectrophotometry, colorimetry, fluorimetry, nephelometry, and flame photometry will be the subject of the second program.

Tuition for each one-week period is $50. Application forms may be obtained from Prof. Walter H. Gale, room 3-107, Massachusetts Institute of Technology, Cambridge 39.

Company Establishes Safety Record

Sand system department at the Commonwealth plant, General Steel Castings Corp., Granite City, Ill., has established a record of three years' operations without a lost-time accident. For 1949 entire Commonwealth plant frequency rate was 6.62 accidents per million man-hours worked, far below the national average for the foundry industry. Dispensary record for December showed not even a minor injury. Ray Sheriff is general foreman of the sand system and Elmer Crane is chairman of the safety committee.

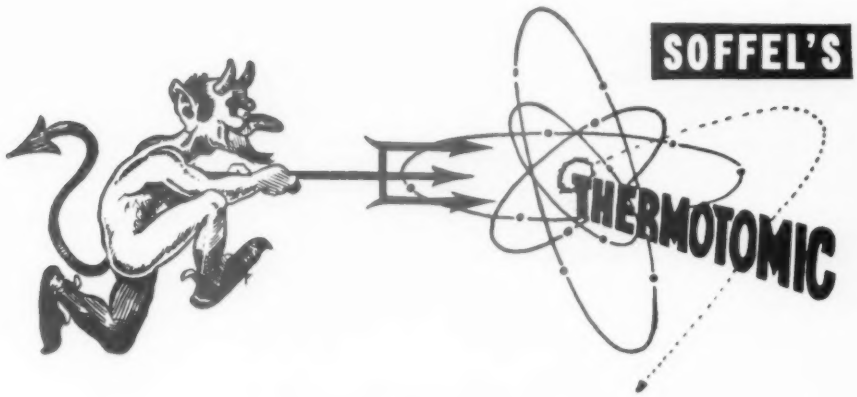
Book Review

FBI Register of British Manufacturers, 22nd edition, cloth, 807 pages, 7⅛ x 9⅛ in., published for the Federation of British Industries by Kelly's Directors Ltd. and Iliffe & Sons Ltd., London. Price 42s.

As the official directory and yearbook of the Federation of British Industries, this book is considered an authoritative guide to sources of supply. It lists nearly 6000 firms and their products, and includes much information of interest and utility to overseas buyers. One section lists manufacturers by product headings. Another section lists names and addresses of member firms and trade associations alphabetically. The Brands and Trade Names and the Trade Marks sections help users to trace the makers and products of which only the brand name or trade name is known.

SOFFEL'S
EXOTHERMIC COMPOUNDS
Keep Feeding Metal Molten

270 pounds solid monel casting made by direct pouring through Thermotomic strainer core under feeding head. Chills were eliminated—no shrink at the flange.



THERMOTOMIC* FOR ALL METALS AND ALLOYS

Soffel's Thermotomic Compounds maintain feeding metal in heads or risers in the fluid state up to 50% longer, ensuring the reservoir of feeding metal remaining molten until all sections of the casting have solidified. Thermotomic Compounds can be molded into any desired shapes and baked like ordinary sand cores. Thermotomic is used as ring inserts under the risers or feeding heads, or as strainer cores under the head or riser for direct pouring through the feeding heads, or as facing inserts where it is desirable to maintain fluidity of metal in the mold at those points where rapid cooling may cause piping, shrinkage or segregation. Temperatures up to 3500° F. are obtained. It permits the use of smaller size feeding heads and risers, and their removal without cutting or burning. The reduction in riser dimensions can produce savings in feeding metal up to 50% and more. Chills can be eliminated in many instances and better castings produced through improved grain structure and increased tensile strength and elongation. Soffel's Thermotomic Compounds are available for all metals and alloys, and should be used in conjunction with Soffel's Carbon Free Liquidizer for best results.

Soffel's Carbon Free Liquidizer is a scientific development for replacing common carbonaceous "head compounds" or "pipe eliminators" used to control shrinkage in the production of ingots and castings of ferrous and non-ferrous metals.

*PATENTED

SOFFEL'S CARBON FREE LIQUIDIZER

Soffel's Carbon Free Liquidizer is different from ordinary head compounds in two ways: It is CARBON FREE, thereby eliminating carbon pick-up in alloy irons and stainless steels, and it is EXOTHERMIC. Carbonaceous materials, regardless of their composition, may cause pick-up, segregation, non-uniform grain structure, and hard spots under risers and in castings. They contribute no heat value whatever and serve only to insulate the metal in feeding heads and risers. SOFFEL'S CARBON FREE LIQUIDIZER, on the other hand, is entirely free from carbon in any form and will NOT contaminate any metal or alloy in any way. In addition, when applied on the heads or risers, the LIQUIDIZER reacts with itself exothermically producing a temperature above 3200° F. This heat actually increases the temperature of the feeding metal to a point well above that of the metal in the main body of the casting, thus ensuring that the feeding metal will be the last to freeze. In this manner, shrink cavities in the casting caused by premature freezing of the feeding metal are eliminated. After the exothermic action has ceased, the LIQUIDIZER forms a soft, insulating blanket on the metal. This confines the heat generated by the LIQUIDIZER and aids in maintaining the high temperature of the feeding metal in the heads or risers.

BEWARE OF IMITATIONS! We Are the Originators of CARBON FREE LIQUIDIZERS and THERMOTOMIC COMPOUNDS

Pittsburgh Metals Purifying Co.

World's Largest Manufacturers of Fluxes and Purifiers for All Metals and Alloys.

1352 Marvista St., N.S. **Pittsburgh 12, Pa.**

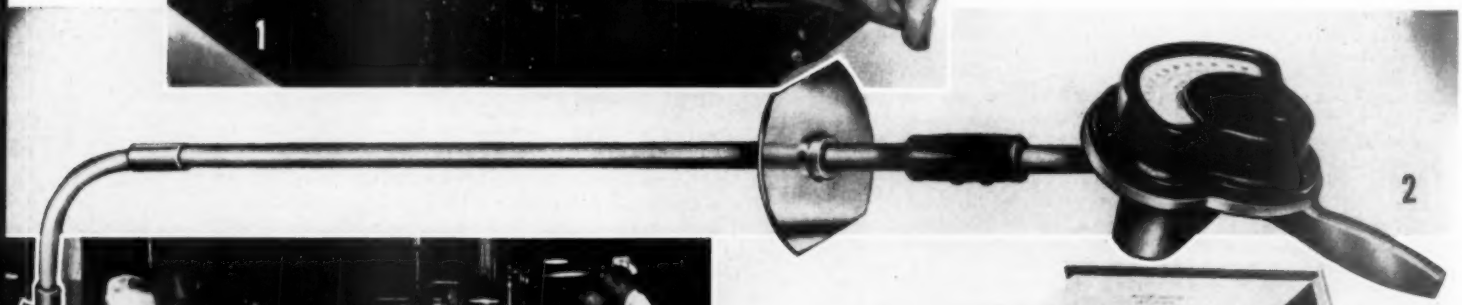
NEW Equipment AND SUPPLIES

For Additional Information on these Items Use Reply Card—Page 207

(1)—File Handle: Riverview Foundry Co., 1148 Davol St., Fall River, Mass.—File handle, designed for quick changing from one size file to another, has a hardened surface, tapered groove into which the shank of the file slips. The handle is designed to fit the hand and fingers without cramping. Protection is provided the hand as the finger grip of the handle loops over the file. During the filing operation, all the pressure is downward and evenly distributed the length of the file. Filing is done with a planing motion. The holder can be used with either flat or half round files, and fits sizes from 8 to 16 in. long. Carpenters rasps also can be used.

For More Details Circle No. 1—Page 207

(2)—Pyrometer: Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4—Pyrometer is designed to measure the temperature of molten white and gray irons in large or small ladles by immersion method. Unit is 64 in. long and weighs 9 lb. The pyrometer frame is Inconel tubing. A fan-shaped meter, calibrated to read from room temperature to 3000° F, is mounted on one end of the tube frame. A noble metal thermocouple encased in a monolithic ceramic covering is mounted at the other end. The meter scale is 6 in. long and has 20-degree sub-gradations. A reflector heat insulator shields the operator's hand from the heat of molten metal. The easily replaceable thermocouple is 6 in. long and the refractory protecting tube is 5 in. long and ⅝-in. in diam. These parts are said to be serviceable up to 75 temperature readings. The relatively small mass of thermocouple and protecting tube subtracts a negligible amount of heat from the molten metal and also insures quick



heating. A temperature reading can be obtained in 25 seconds when the unit is warm from previous use, or in 45 seconds with a cold unit. Meter is compensated from ambient temperature and for change in resistance due to temperature change of extension leads, by a correcting secondary couple mounted within the tube frame.

For More Details Circle No. 2—Page 207

(3)—Power Sweeper: G. H. Tennant Co., 2530 North Second St., Minneapolis 11—Vacuum-equipped power sweeper designed for high speed industrial use is said to sweep over 43,500 sq ft per hr. It is operated by one man. A 24-in. wide brush revolving inside a sealed-to-floor compartment, hurls dirt and litter into a built-in, floating type hopper. At the same time a vacuum fan draws dust into a fabric bag. The hopper automatically compensates for irregular floor surfaces and bulky debris. Special features include a two-speed transmission, automatic clutch and reverse gear. Speed range is from 2 to 8 mph. Since brush and vacuum fan are powered directly from the 4.4-hp air-cooled engine, soilage pick-up is said to be efficient at any speed. Sweeper is equipped with front wheel automotive type steering, both foot and parking brakes, and sealed ball and roller bearings throughout. A rotary side brush for sweeping flush with walls is offered.

For More Details Circle No. 3—Page 207

(4)—Hoppers: Roura Iron Works Inc., 1407 Woodland Ave., Detroit 11—Special 1-yd capacity, heavy duty, self-dumping hoppers are built of ½-in. plate and are designed to withstand warping when handling red hot sprues and castings. This new heavy duty hopper is built to fit any standard type lift truck. Truck operators may unload the hoppers by lifting a patented instant release handle. Other standard hoppers come in ½, ¾, 1, 1½ and 3 cu yd sizes. They also can be designed for flat trucks and with special flanges to permit stacking.

For More Details Circle No. 4—Page 207

Fork Truck: Baker Industrial Truck Division, Baker-Raulang Co., 1250 West 80th St., Cleveland 2—Center control electric fork truck in the 3000 and 4000 lb capacity class has been designed for economy, safety, and operator convenience and comfort with unnecessary frills omitted. It is adapted to operation in narrow aisles and congested areas. Operator may enter the driving position from either side of the truck. Directional, hoist and tilt control levers are convenient to the operator's right hand on the dash panel. An electrical interlock with the brake and the seat provides dead-man control. Air-cooled drum type brake is mounted on the motor shaft to take advantage of braking through gear train and differential which provides equalized braking. Specifications are: Width over drive wheels, 35¼-in. for the 3000-lb capacity model and 27¼-in. for the 4000-lb model. Otherwise both models have an outside turning radius of 73 in.; minimum intersecting aisles, 64 in.; right angle turn, 89½-in. plus length of load; single lift, 64 in.; telescoping lift, 126 in., and free lift of 63 in.

For More Details Circle No. 5—Page 207

Sand Mixer: Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5—New sand mixer illustrated below is equipped with rotating spatula-like blades made of flexible spring steel. These fold the mix over and upon itself with a squeezing-aerating action which is said to produce a fluffy sand that needs no further aerating. Because the blades compensate for variations in sand weight, it is claimed that there is no crushing of sand granules and no overheating of sand. Machine weighs 1060 lb and has a potential hourly capacity of 4000 lb of oil core sand or facing sand per hour. Individual batches weigh 200 to 300 lb and take from 1½ to 3 minutes to mix, depending upon the type of sand used. The unit is operated by a 5-hp direct-connected motor and is designed with an open top for easy loading. A guarded spring side-opening discharge door is 27½ in. off the floor, high enough to accommodate a 3-cu-ft wheelbarrow. Overall height is 3 ft, 8½ in., and pan diameter is 2 ft, 6 in. All vital mixing parts are made of high carbon steel and are designed for easy replacement.

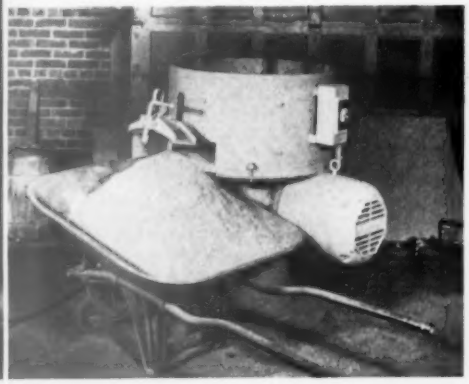
For More Details Circle No. 6—Page 207

Chipping Hammers: Ingersoll-Rand Co., Phillipsburg, N. J.—New line of chipping hammers is designed to meet the cutting conditions imposed by present-day metals. Through a new hard-surfacing process, hammer piston life is said to be increased 12.3 times. Other important hammer parts also are treated

to increase tool life. A new air valve accurately proportions the amount of air fed to the front and rear of the piston to maintain top cutting efficiency under all conditions, provides a smooth flow of full power, and eliminates short stroking and loss of power on heavy cuts, it is claimed. Fifteen power sizes with five basic hammer sizes are offered. Each basic hammer size is available in normal-cut, extra-cut, or supercut types. Three types of handles which lock in place also are offered.

For More Details Circle No. 7—Page 207

Dust Filter: W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2—Three advantages are claimed for a new dust filter manufactured by the company: Filter operation need not be stopped to remove accumualted dust from the bags, longer bag life by the elimination of shaking or flexing, and no gradual loss of efficiency due to building up of a dust layer on the cloth bags. By frequent applications of blasts of reverse air, the filter prevents accumulation of dust on the cloth bags. Created by the main fan



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A FURNACE FOR EVERY NON-FERROUS MELTING REQUIREMENT

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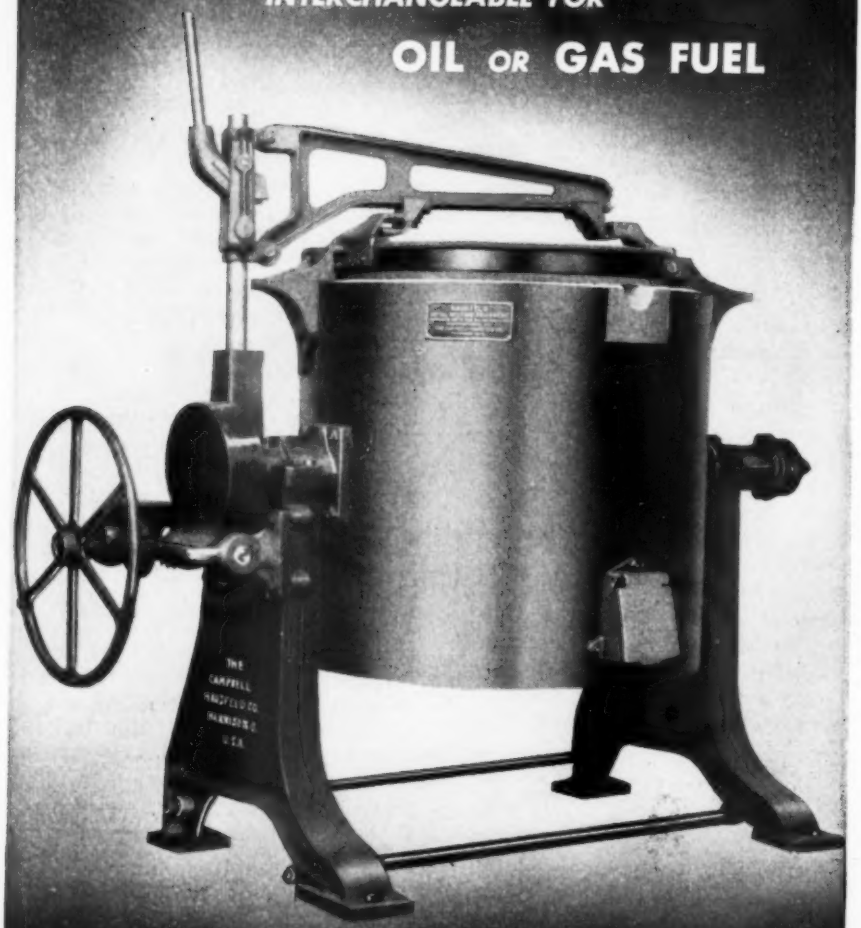


Built for Service

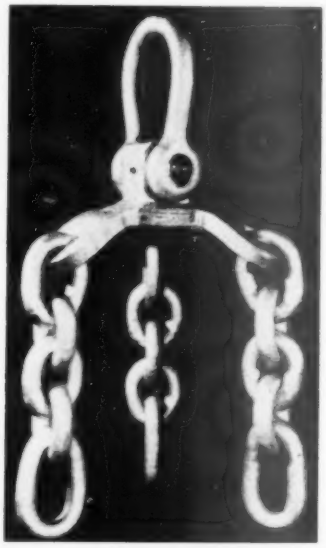
The Campbell-Hausfeld Co.

300-320 MOORE ST. HARRISON, OHIO

of the dust control system, these blasts require no auxiliary equipment. All shaking mechanism has been eliminated. Operation is continuous and automatic, and the suction at dust source is said to remain always uniform. Present installations of the company's dust filters can be changed over to embody the new feature.

For More Details Circle No. 8—Page 207

Magnet Chain: Woodhouse Chain Works Inc., 251 Third St., Trenton, N. J.—New low-headroom magnet sling chain has a top plate to keep the three attachment chains in place when fastened to the magnet. This is said to prevent excessive wear on the end links. The sling



shackle is made with a bronze bearing and equipped with a lubrication fitting. Bow of the shackle is hardfaced at the bearing point to withstand wear against the crane hook. Safe working load capacity of the sling is 50,000 lb.

For More Details Circle No. 9—Page 207

Automatic Control: Assembly Products Inc., Main at Bell St., Chagrin Falls, O.—Automatic controller for controlling many processes and operations is available in all ranges of voltage and current. In the more sensitive ranges it is responsive to changes of ½ microampere or a fraction of a millivolt, it is claimed. When calibrated in millivolts and furnished with dial graduations marked in degrees of temperature it may be used as a pyrometer control. It also is claimed that by using instrument rectifiers and current transformers the unit will indicate and control alternating currents and voltages. The control unit consists of a contact meter relay with built-in microcontacts and load relay rated at 15-amp, 115-v and 7½-amp, 230-v load. There also is an interrupter relay for the

(*Continued on page* 210)

HELPFUL LITERATURE

50. Materials Handling

Brummeler Steel Products Corp.—4-page illustrated bulletin depicts various materials handling equipment fabricated by this firm such as overhead conveyor racks, casting cooling boxes, dump hoppers, parts box trucks, steel pallets and heavy forging boxes.

51. Metal Cutoff Band Saw

Johnson Mfg. Corp.—8-page illustrated bulletin describes metal cutoff band saw for speedy accurate metal cutting. Saw is of horizontal type and is designed to shut off automatically. Units can be obtained having 10 x 18-in. capacity for either dry run-of-mill cutting or wet type for production cutting.

52. Zircon Foundry Sand

Millmaster Chemical Corp.—8-page bulletin entitled "Berk Zircon Foundry Sand" describes how zircon, long known as gem stone, has become important industrial material. It is available in commercially pure and controllable quality; and because of combination of certain properties, it is of especial interest to foundrymen casting alloy and carbon steel, gray iron and bronze.

53. Portable Air Hoist

Keller Tool Co.—8-page illustrated catalog section 86 deals with air hoist which is available in 300, 500, 1000 and 2000-lb capacities. This one-man, one-hand control unit is lightweight, has variable speed, can be lifted and carried without strain, and permits load lowering without air. Rated speed at full load is 17 fpm for larger models and 75 fpm for smallest.

54. Nonferrous Ingot Metal

Western Metal Co.—40-page booklet entitled "Specifications of Nonferrous Ingot Metal Alloys" is compilation of handy reference material on most commonly used copper and aluminum base alloys.

55. Power Conveyors

Industrial Engineering & Mfg.Co.—2-page illustrated leaflet "Universal Industrial Conveyors" discusses five models with channel lengths from 8 to 24 ft and maximum elevations to top of belt from 5¾ to 16¾ ft. Conveyors are 15 ft wide and have 12-ft belt width. They are driven at belt speed of 74 fpm by motors ranging from 1/3 to 1 hp.

56. Stock-Straightener-Cutter

Mettler Machine Tool, Inc.—2-page illustrated leaflet "Presenting a New Shuster Automatic Flat Stock Machine" contains description of machine that straightens and cuts flat, square or hexagon stock. Unit features 12-roll straightener and instantaneously operating clutch and cutoff cam.

57. Flexible Shafts & Machines

N. A. Strand & Co.—112-page illustrated catalog No. 29 lists various types and models of flexible shafts and machines for grinding and wire brushing applications in foundry. Specification tables given at bottom of each page assist user to find capacity of machine required to carry specific size grinding wheel.

58. Safety Equipment

General Scientific Equipment Co.—46-page illustrated catalog "Everything in Safety" covers respiratory and eye protection devices, hats, gloves, carboy pumps, drum pumps and other industrial safety equipment for use in industries, mines and utilities.

59. Overhead Conveyors

Cleveland Tramrail Div., Cleveland Crane & Engineering Co.—12-page illustrated form 2008 E contains engineering and application data on line of overhead materials handling equipment. Covered are rail and arch beam, cranes and transfer bridges, switches, carriers for hand or electric operation, hoists, gantry cranes, buckets and grabs for complete Tramrail systems.

60. Equipment Laboratory

Laboratory Equipment Corp.—56-page illustrated brochure covers line of precision control equipment and apparatus for precise and rapid analysis in metallurgical laboratories. Representative of equipment described are furnaces; carbon, sulphur and moisture determinators; combustion boats and complete line of accessories.

ADDITIONAL INFORMATION?

For additional information on any of the items described under "New Equipment and Supplies", "Trade Publications" or "Helpful Literature" in this issue — simply circle their corresponding item numbers on one of these cards.

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61. Industrial Truck

Kalamazoo Mfg. Co.—4-page illustrated bulletin No. KT-1 depicts uses of Kal-Truk industrial truck which has 13-hp 2-cylinder Wisconsin air-cooled engine, three speeds forward and reverse, fully enclosed heavy duty tractor clutch, and full-floating drive axle. Capacity is 2/3-yd or 3000 lb.

62. Spectrographic Analysis

Spectrochemical Laboratories, Inc. —2-page illustrated leaflet is entitled "Product Control Now Available within Hours Instead of Days." Service offered consists of identification of presence or absence of 72 of the elements including all metals, most semi-metals and fluorine. Wet chemical analysis problems are also accommodated.

63. Air Hoist

Ingersoll-Rand Co.—8-page illustrated circular form No. 5020 presents specifications and shows numerous installations utilizing Air-Bloc lightweight heavy-duty air hoist which can be moved about easily and quickly hung in position. Loads up to 700 lb can be handled by various sizes in which it is available.

64. Grinding Wheels

Macklin Co. — Illustrated folder form No. 47-A presents brief descriptions of cutoff, centerless, cylinder, toolroom and internal wheels; sticks; segments and rubbing bricks.

65. Process Instruments

Wheelco Instruments Co.—Series of eight illustrated bulletins presents information on complete line of instruments. Booklet D602-4 describes portable pyrometers; No. A502-4, portable potentiometer; No. RT-1, indicating resistance thermometer; No. C2-1, Capacilog electronically operated scriber; No. MC-1, Multi-Switch Capacitrol indicating pyrometer controller; No. F2-1, Flame-otrol combustion safeguard; and No. PC-1, Panelmount Capacitrol series of indicating pyrometer controllers.

66. Pneumatic Equipment

Cleco Div., Reed Roller Bit Co.—10-page illustrated catalog No. HF 747 describes and lists sizes of air line couplings, pressure-seated air valves, air hose, grooved hose nipples, hose clamps, hose menders and mender clamps, blow guns and miscellaneous accessories.

67. Diecasting Machine

Cleveland Automatic Machine Co. —4-page illustrated folder "Cleveland Universal High-Pressure Hydraulic Die Casting Machine" discusses construction and presents specifications of model 50 diecasting machine. Features include extra heavy construction, easy accessibility, automatic control, movable platen support, seamless steel tubing with swivel fittings in hydraulic system, and hardened toggle pins and bushings.

68. Steel Wire Products

Colorado Fuel & Iron Corp.—36-page illustrated catalog entitled "Principal Products of CF & I" lists various steel and wire products. Typical items include semifinished and hot-rolled steel, rails and accessories, wire and wire specialties, wire rope, welded wire fabric, netting, fencing, springs, automotive products and conveyor belts.

69. Blasting Nozzles

Victor Equipment Co.—12-page illustrated folder form No. 311 discusses Super-Titan tungsten carbide blasting nozzles and lists helpful information relevant to operation of blast cleaning equipment. Tabular data include recommended pressures, compressor displacements, nozzle sizes, sizes and lengths of hose, and blast cleaning speeds for various materials.

70. Materials Handling Trucks

Knickerbocker Co., Truck-man Div. —8-page illustrated bulletin "3 Models Do 4 out of 5 Material Handling Jobs" relates operating and construction features of Truck-man pallet, skid and platform trucks. Having combination seat and guard for operator, trucks are gasoline engine powered and can handle from 2000 to 3500 lb.

71. Low-Temperature Pyrometer

Illinois Testing Laboratories, Inc. 2-page illustrated leaflet "Alnor Type 2300 Pyrometer" describes instrument which measures temperature in range of 0 to 150° F. Accurate device is usable for such applications as panel heating tests and checking temperatures on work where precision machining is required.

72. Abrasive Belts

Minnesota Mining & Mfg. Co.—36-page illustrated booklet "Step up Production" presents case history examples and technical data on grinding and polishing with abrasive belts. Details are given on belt equipment, belts and various contact wheels that support belt at point of contact with work.

73. Drilling & Tapping Units

Govro-Nelson Co. — 8-page illustrated circular "Govro-Nelson Automatic Drilling & Tapping Units" describes automatic units which employ centrifugal force to provide thrust to feed tool into work. When required depth has been reached as set by stroke adjustment, spindle returns to starting position.

74. Lift Truck

Hyster Co.—8-page catalog No. 1135 contains model view, action photographs and descriptive text on 2000-lb capacity industrial power lift truck which has been completely redesigned. Chief improvements are cooler operating temperature, larger clutch, standard automotive type battry, easier steering, better braking power and increased speed.

1	21	41	61	81	101
2	22	42	62	82	102
3	23	43	63	83	103
4	24	44	64	84	104
5	25	45	65	85	105
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8	28	48	68	88	108
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14	34	54	74	94	114
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16	36	56	76	96	116
17	37	57	77	97	117
18	38	58	78	98	118
19	39	59	79	99	119
20	40	60	80	100	120

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Penton Building, Cleveland 13, Ohio

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Smith L-O Core Oil

Here is a good core oil . . . a fine core oil . . . a quality core oil. It rates tops with core makers because it makes sand easy working . . . it leads to true, clean cores. The perfection and absolute uniformity of this product can be directly attributed to exacting laboratory research and controlled manufacture by the Dow-Therm method of heat treatment. A trial run with Smith L-O will give conclusive proof of its superiority . . . Yes, it will be *the favorite of your foundry crew.*

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SMITH OIL & REFINING CO

MANUFACTURERS OF L-O AND CERTIFIED CORE OILS

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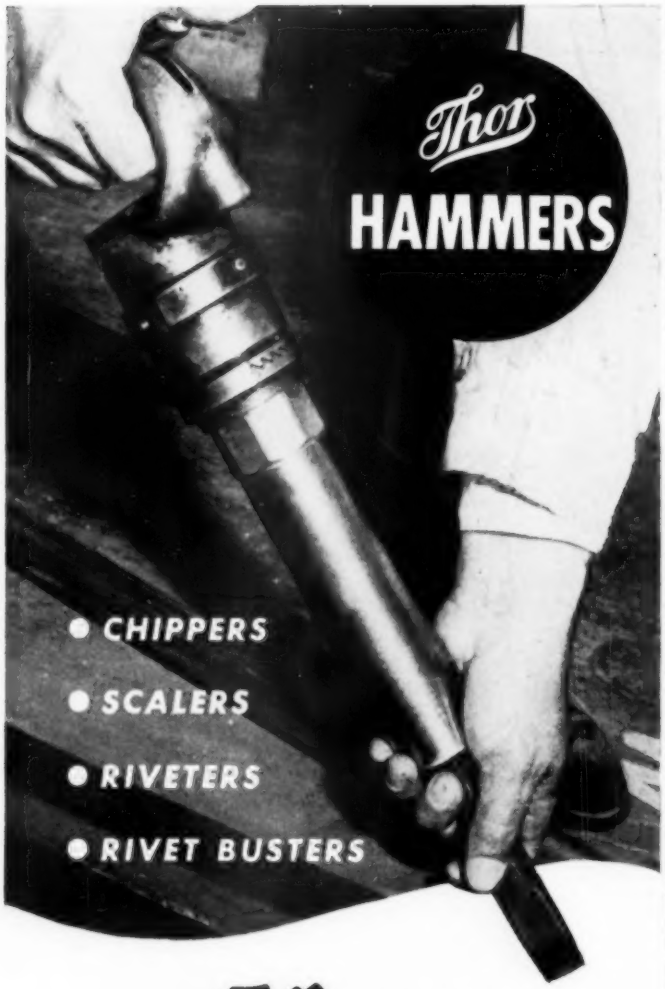

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Air tools for the foundry since 1893—today, a complete line of all sizes and types of hammers for chipping, scaling, etc. Every model packed with rugged Thor power . . . designed for fast, efficient work . . . built for longer service. Let an experienced Thor air tool engineer show you—write or call today for free demonstration. Independent Pneumatic Tool Co., Aurora, Ill.

Write for Free Air Tool Catalog P-1.

Thor PORTABLE POWER TOOLS
ELECTRIC • PNEUMATIC

(*Continued from page* 206)

microcontact locking circuit. An isolating power transformer with 110 and 220 v connections, rectifier and filter system to supply power for the relays is included.

For More Details Circle No. 10—Page 207

Lift Truck: Hyster Co., 2902 N. E. Clackamas St., Portland 8, Oreg.—An improved model, 2000-lb capacity lift truck is powered by an air-cooled gasoline engine designed to withstand

extremes in weather conditions. Engine accessory improvements include a redesigned muffler with spark arresting features, and a larger gasoline tank to permit full 8-hr work shifts without refueling. A larger clutch and heavier duty transmission have been incorporated. Uprights now are mounted on an extension of the truck frame rather than to the transmission case. Tilt control of the uprights is accomplished through double-acting hydraulic cylinders for both directions of tilt. The truck may be fitted with company special-purpose attachments such as load-grab, paper-roll grab, scoops, booms, guards, and towing hooks.

For More Details Circle No. 11—Page 207

Stock Carrier: Rack Engineering Co., 925 Liberty Ave., Pittsburgh 22—Portable stock carrier is

made of seamless square tubing and is designed with removable sides and ends. Entire unit is of welded con-

(*Continued on page* 212)

COLEMAN OVENS BAKE CORES AT LOWER COST than any other known method

COLEMAN OVENS, because of their exclusive features, produce at the lowest cost, since they—

...***use*** the handling method that gives you the greatest savings in labor!

...***obtain*** the greatest savings from the most economical fuel available!

...***permit*** you to use the most satisfactory binder for your work!

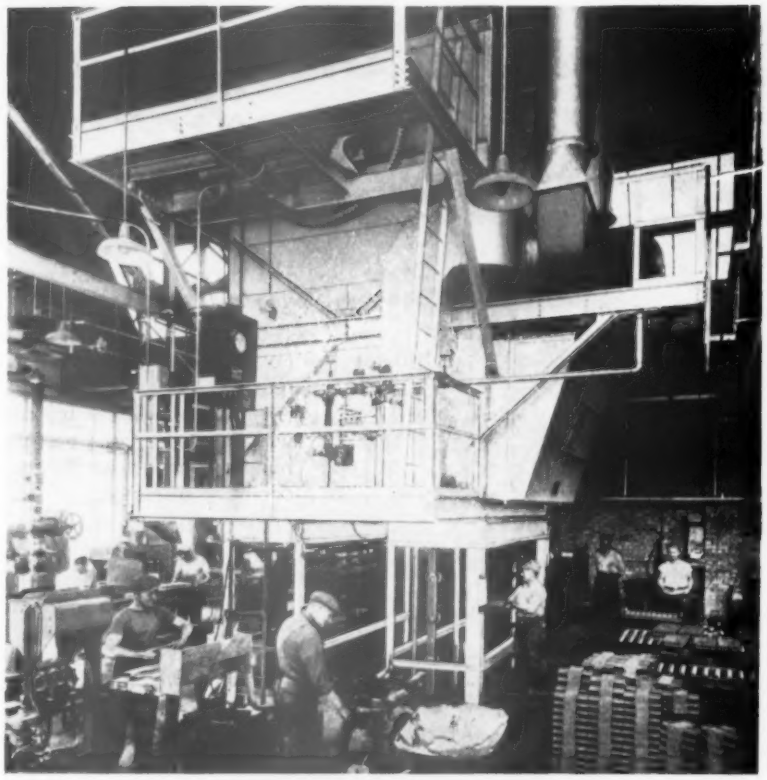
...***utilize*** your available space to the greatest advantage!

...***assure*** perfect baking and drying, eliminate rejects and makeovers.

...***keep*** maintenance cost and time down to a minimum.

COLEMAN OVENS back up these statements with experience gained from over 10,000 installations. No other method of baking cores can match these results...no other core-baking system can meet this record!

For full information about Coleman Ovens write for Bulletin 48 today!



COLEMAN TOWER* OVEN
at Wells Manufacturing Company,
Skokie, Illinois

High speed core production at lowest cost. Patented Open Center provides greater loading accessibility and increases core-maker productivity.

COLEMAN OVENS **are built in a complete range of sizes and capacities for every core-baking and mold drying requirement: Tower Ovens, Horizontal Conveyor Ovens, Car-Type Ovens, Transrack Ovens, Rolling Drawer Ovens, Portable Core Ovens, Portable Mold Dryers, etc.**

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WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

THE FOUNDRY EQUIPMENT COMPANY

1831 COLUMBUS ROAD CLEVELAND 13, OHIO

OVER 10,000 SUCCESSFUL INSTALLATIONS

You cannot afford to turn your back on these facts:

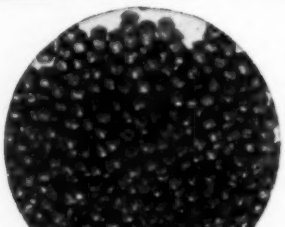
20th CENTURY DRAWN STEEL SHOT for PEENING and BLAST CLEANING.

The payoff comes from the results you get.

The New 20th Century Drawn Steel Peening and Blast Cleaning Shot is more efficient because the pellet size is made absolutely uniform to start with, and the mass remains uniform hundreds of passes longer than with ordinary abrasives.

20th Century Drawn Steel Abrasive is more economical because it outlasts conventional hard iron shot 8 to 1, and cast steel shot at least 2 to 1, thereby reducing abrasives purchases and freight and freight handling cost.

The original form.



After 98 passes.

20th Century Drawn Steel Abrasive is dependable. Made by one of the older and reliable abrasive manufacturers.

A trial is convincing. Send your first order today. There is a size for every need.

THE CLEVELAND METAL ABRASIVE CO.

Main Office and Plant: 880 East 67th Street, Cleveland 8, Ohio

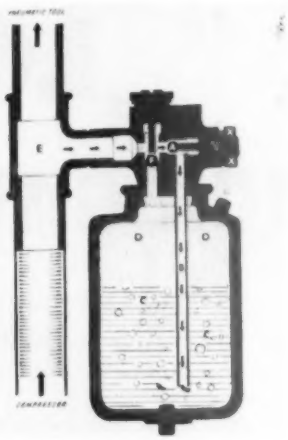
Howell Works—Howell, Michigan

(*Continued from page* 210)

struction. The carrier is built in 20 different stock sizes, for handling almost any type of material.

For More Details Circle No. 12—Page 207

Air Oiler: Bonvillain & Ronceray Inc., 107-03 86th Ave., Richmond Hill 18, N. Y.—Air oiler for lubricating molding machines and other pneumatic machines and tools



operates automatically. Variation of pressure in the air line caused by operation of the machine or tool actuates the lubricator. An increase of pressure opens ball valve *A*, shown in the accompanying illustration. Air is forced down through tube *B* and up through the oil *C*. The air bubbles burst at the oil surface, atomizing the oil. Atomized oil remains in compression in chamber *D*, until a decrease of pressure in the air line releases ball valve *F* and a puff of atomized oil goes into the air line *E*. Oil consumption is regulated by adjusting intake air valve *A*, with adjusting screw *Y*. Locknut *X* holds adjusting screw at the desired setting.

For More Details Circle No. 13—Page 207

Testing Balls: Kennametal Inc., 1 Lloyd Ave., Latrobe, Pa.—Brinell hardness testing balls are made of a heat-resistant material, basically titanium-carbide. The new material is said to combine great strength with high resistance to oxidation, thermal shock, abrasion, and corrosion. The balls are ground to true sphericity and close tolerance, and are available in the standard size of 10 mm.

For More Details Circle No. 14—Page 207

Floodlights: General Electric Co., Schenectady 5, N. Y.—Two new heavy-duty floodlights rated at 500 w and 1000 w can be used for all general purpose applications and are available for either general lighting service or floodlighting service lamps. Weather-tight and substantially constructed of heavy gage aluminum,

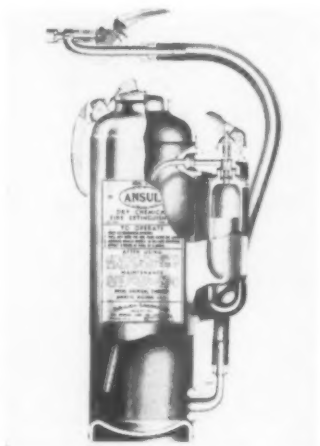
each of the units weighs less than 17 lb. A clamping handle for vertical adjustment is provided so that the floodlights can be serviced completely without the use of tools. Floodlights can be provided with either narrow beam polished or wide beam etched reflectors and are available in three standard mountings, including a portable base.

For More Details Circle No. 15—Page 207

Band Saw: Moak Machine & Tool Co., 2547 Connor St., Port Huron, Mich.—Band saw has been developed for foundry use in cutting ferrous and nonferrous metals. Heavy-duty four-speed transmission gives a range of operating speeds from 150 to 1200 rpm. Saw is equipped with prelubricated and factory-sealed bearings in the wheels and motor. New two-wheel equalized brakes are said to stop the wheels smoothly and are energized automatically if a blade breaks.

For More Details Circle No. 16—Page 207

Fire Extinguisher: Ansul Chemical Co., Marinette, Wis.—Improved model fire extinguisher is said to be completely water-tight. Among the new features are threaded hose connections, new cartridge guard finger grip and redesigned carrying handle. The extinguisher is designed for protection against flammable liquid, gas, and electrical fires. The dry chemical used is claimed to be water-repellent, nontoxic, noncorrosive, nonabrasive, nonconductor of



electricity, and not to freeze, solidify, deteriorate or evaporate, nor to be affected by normal temperature extremes.

For More Details Circle No. 17—Page 207

Thermal System: Taylor Instrument Companies, 95 Ames St., Rochester 1, N. Y.—Newly developed mercury thermal system is intended for use in measuring and controlling temperatures above the conventional 1000° F indication in industrial proc-

You cannot afford to turn your back on these facts:

20th Century Normalized Shot and Grit is long on results and easy on equipment.

It is stress relieved and there is practically no shattering. Lasts at least twice as long as ordinary abrasives — cuts freight and freight handling in half. Reduces equipment wear and maintenance 50% to 75%.

20th CENTURY NORMALIZED

Licensed under U. S. Patent No. 2184926 U.S. Application No. 619602

The Leader of Malleable Shot and Grit!

EXCLUSIVE SCREENING PROCESS insures amazing uniformity—freer flowing abrasive and better cleaning.

20th Century Normalized Abrasive is its own best salesman. *Send a trial order today.* Made in all screen sizes.

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Howell Works—Howell, Michigan

Prompt shipment—unlimited quantities now available to foundries from BAROID—the world's largest producer of Bentonite. Our modern plants are geared to fulfill every requirement of the foundry trade.

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Marthens Company
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Carl F. Miller & Co.
Seattle, Washington

Pennsylvania Foundry Supply & Sand Co.
Philadelphia, Pennsylvania

Robbins & Bohr
Chattanooga, Tennessee

Smith-Sharpe Company
Minneapolis, Minnesota

Southwest Foundry Supply Co.
Houston, Texas

Steelman Sales Company
Chicago, Illinois

Stoller Chemical Co.
Akron, Ohio

Wehenn Abrasive Co.
Chicago, Illinois

Mr. Walter A. Zeis
Webster Groves, Missouri

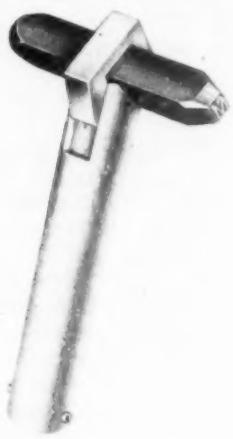
BAROID
SALES DIVISION
NATIONAL LEAD COMPANY

BENTONITE SALES OFFICE:
RAILWAY EXCHANGE BLDG.
CHICAGO 4 • ILLINOIS

essing operations. Features include a newly developed bourdon type spring, type 347 stainless steel thermal element, compensation for varying case and ambient temperatures, and uniformly graduated charts. Range spans of 400, 600, and 1000° F or equivalent Centigrade are available. No system can be furnished in which the range starts at temperatures below 700° F.

For More Details Circle No. 18—Page 207

Tool Holders: M. E. Cunningham Co., 97 East Carson St., Pittsburgh 3—Adjustable hand tool holders are designed to prevent smashed fingers in the use of steel stamps, cold chisels, drifts, punches and other hand tools. The improved design permits the slotted head section to be pushed out, and stamps quickly



changed by the first finger and thumb. Size 1 holder is applicable to ¼-in. and ½-in. tools, and size 2 to ¼-in. to ¾-in. square tools. Holders can be used with square, round, octagon and hexagon shaped tools.

For More Details Circle No. 19—Page 207

Temperature Indicators: Tempil Corp., 132 West 22nd St., New York 11—Compounds in pellet and crayon form are designed to melt at a predetermined temperature when applied to metals being heated. Addition of high temperature ratings makes pellets now available in 12½-degree steps from 113 to 400° F, in 50-degree steps from 400 to 2000° F, and in 100-degree steps from 2000 to 2500° F. In crayon form the compounds are available in corresponding intervals from 113 to 2000° F. In paint form they are offered in similar steps from 113 to 1600° F.

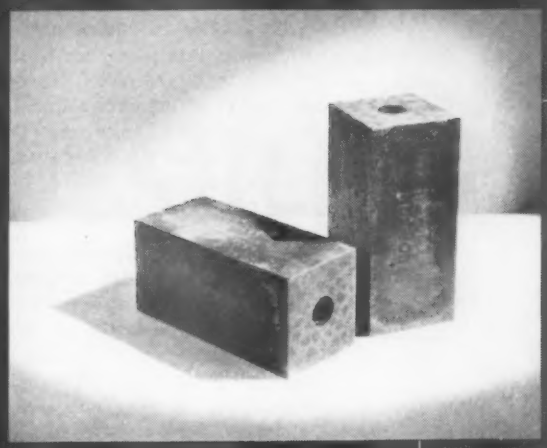
For More Details Circle No. 20—Page 207

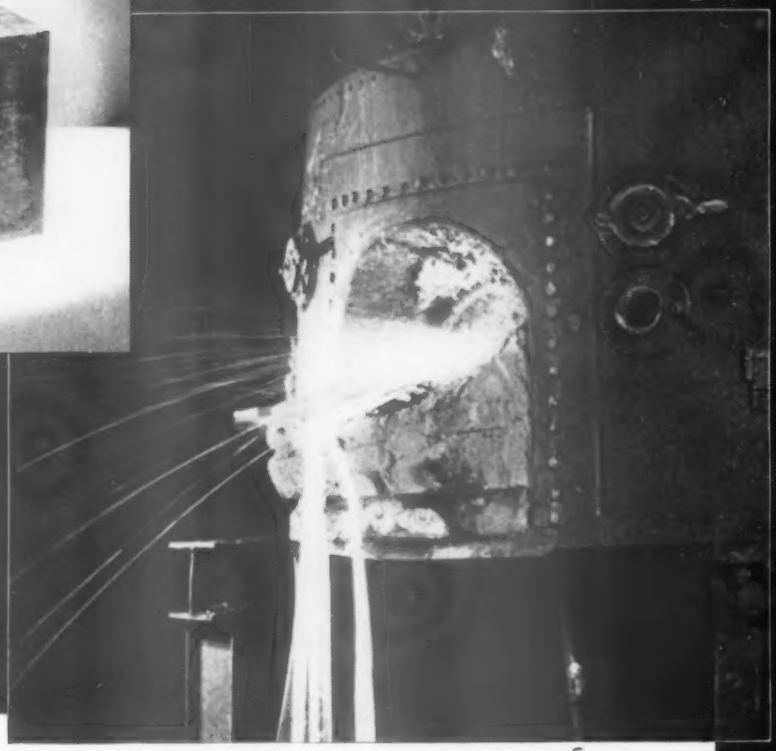
Abrasive: American Wheelabrator & Equipment Corp., 505 South Byrkit St., Mishawaka, Ind.—Newly developed abrasive for blast cleaning and finishing operations is nonmetal-

(*Continued on page* 216)

CRYSTOLON Slag Hole Blocks

Pay Their Way in the Foundry





CRYSTOLON slag hole blocks, made by Norton Company of densely bonded silicon carbide grain, give long trouble-free service in foundry cupolas. The hard, dense surface of these chemically inert blocks is resistant both to the abrasion and penetration of molten slag.

CRYSTOLON blocks resist all slag action either by corrosion or erosion. Consequently the hole size is maintained for a longer period of time, giving better control of the flow. These rugged slag hole blocks are highly refractory and will neither soften nor spall at temperatures up to 1650°C.

NORTON REFRACTORIES LIKE HEAT

NORTON COMPANY · WORCESTER 6, MASS.

The First Major Improvement in Chilled Iron Abrasives in 76 Years!

For Greater Durability and Lower Repair Costs!

Actual comparative performance tests between "T" Abrasives and conventional hard chilled iron abrasives show that "T" Abrasives give . . .

- ★ Up to 88% longer abrasive life
- ★ Up to 83% longer blade life
- ★ Rapid cleaning action
- ★ From 30-50% reduction in total abrasive and maintenance costs.

★ ★ ★ ★

HAVE YOU SEEN THE HAMMER TEST?

Produced Exclusively By
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Cleveland, Ohio
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(*Continued from page* 214)

lic and silica-free. It is said to be a sharp fast-cutting abrasive which retains its abrading qualities even when reduced to very fine material. Other features claimed are that it has much the same properties as sand, although there is no free silica; it wears two to five times longer than sand; it is less damaging to equipment, thereby reducing maintenance costs; it is noncorrosive and stainless; it does not rust, pack or harden; and it flows freely. The abrasive is supplied in a variety of sizes graded for any type of work or finish desired.

For More Details Circle No. 21—Page 207

Welding Accessory: Hobart Brothers Co., Hobart Square, Troy, O.—Remote start-stop switch mounted on a stand is designed for use with any motor-generator welder having push button starting. When the electrode holder is hung on one of the

arms the circuit is broken and the arc welding machine automatically is shut off. When the electrode holder is removed from the hook, the arc welding machine automatically is started. Thus the machine runs only when welding is being done. The stand also provides a convenient place for a remote control rheostat, electrodes, chipping hammer, wire brush, and other equipment.

For More Details Circle No. 22—Page 207

Core Sand Binder: Monsanto Chemical Co., Everett, Mass.—New core sand binder, known as Resinox 4846, is a synthetic thermosetting resin, a rapid-curing phenolic of high bond strength. It is said to provide cores with high tensile strength, high baked permeability, resistance to abrasion, rapid baking, excellent detail and dimensional stability and good collapsibility at the shakeout. Economies in its use are claimed to result through good surface finish of castings, reduced tendency toward veining, scabbing, spalling, blows and hot tears, low fuel consumption in baking, and resistance

(*Concluded on page* 218)

For Greatest Efficiency
At Lowest Cost

DESULFURIZE
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SODA ASH

For a Quality Soda Ash
At No Extra Cost

Specify **SOLVAY**
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DENSE SODA ASH

Especially Designed for Desulfurization

★ MEDIUM GRAIN SIZE ★ DUSTLESS ★ HIGH CHEMICAL PURITY

Simple, efficient, low-cost equipment for automatically feeding Soda Ash into molten iron for desulfurization is now available. We will be glad to supply detailed information concerning this equipment and its installation upon request.

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"FALLS BRAND" ALLOYS
AMERICA'S LARGEST PRODUCERS OF ALLOYS

"FALLS"
COPPER
SHOT

for Addition to Cast Iron

Promotes the following properties:

Increased tensile strength, transverse strength and Brinell hardness.

Increased wear resistance—Increased resistance to heat and corrosion.

Increased fluidity and sharper castings.

WRITE FOR COMPLETE DETAILS

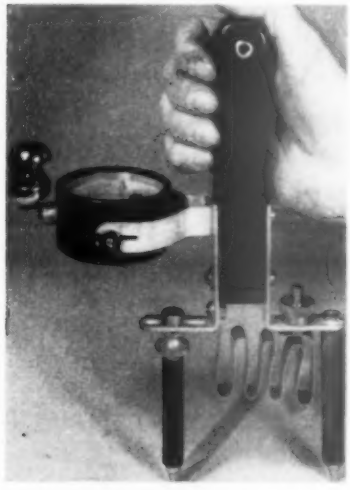
NIAGARA FALLS
Smelting & Refining Division
Continental Copper & Steel Industries, Inc.
BUFFALO 23, NEW YORK

(*Concluded from page* 216)

to breakage in storage. Gas products of the resin-cereal decomposition during casting are said to burn readily without formation of obnoxious odors or lacrimatory smoke.

For More Details Circle No. 23—Page 207

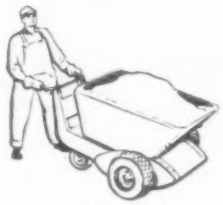
Battery Tester: General Scientific Equipment Co., 2700 West Huntingdon St., Philadelphia 32 — Battery cell tester is designed to show instantly the condition of a 6-volt battery. Prods are adjustable and will fit the terminals of any battery. One prod can be moved in a specially designed slotted holder to obtain proper spacing to test batteries with cells mounted lengthwise. The full size colored dial has a long scale for easy reading. "Dead, Discharged and Charged" scale markings show battery condition at a glance. A light illuminates the dial in dark places and goes out when cell is dead and dims when cell is low.



For More Details Circle No. 24—Page 207

Sand Stabilizer: Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5—Processed cellulose sand additive has been developed for use in gray iron, malleable and nonferrous casting production to act as a stabilizer for the control of expansion of core sand, facing sand and backing sand. It is said that high combustibility of the product allows the sand to expand evenly upon contact with the molten metal, thereby reducing casting defects generally attributable to physical conditions of the facing or molding sand. The compound is said to burn out quickly. It has a low ash content and little deteriorating effect on sand to be reused. Other features claimed are that it increases sand flowability, broadens the safe operating moisture range, gives a smooth casting finish, and uniform mold or core hardness.

For More Details Circle No. 25—Page 207



Bucket holds 10 cubic feet . . . 18 with sideboards

Mechanically dumped . . . operates by foot pedal

9-square-foot steel platform takes half-ton loads

Climbs 20% grades fully loaded

50-inch steel blade makes Prime Mover an efficient snow plow

FEATURES:

- gear driven . . . no belts or chains
- fully enclosed engine protected against dirt and moisture
- clutch, engine, transmission all run in oil
- switch from bucket to platform without tools . . . in less than a minute
- turns in its own length (63½"); width 31½"
- 3-gallon tankful of fuel gives 8 hours continuous service

A PRODUCT OF

THE PRIME-MOVER CO.

MUSCATINE, IOWA

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The BELL Prime Mover*

. . . here's what foundries say about this versatile, cost-cutting machine

Rochester, N. Y.—"We save from 8 to 24 man-days each week with a Prime Mover. It hauls sand 500-600 feet from outside storage bins to inside bins, then to bench and floor moulding operations. Also use bucket to haul silicon and fire clay. Platform-equipped Prime Mover is used to move pig iron to inside storage room near charging elevator."

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Charleston, W. Va.—"This is a small foundry and, because of the extra load carried by the Prime Mover and the machine's ability to work in narrow aisles, the operator of the Prime Mover saves enough time in the distribution of sand so that he can also operate the muller."

Linfield, Pa.—"Prime Mover used to distribute core and moulding sand, to remove cupola residue, to distribute concrete from ready-mix truck for periodic pouring on sections of floor. Estimated savings of 2 to 4 man-days daily with one machine."

● Convincing as these statements are, they still do not do full justice to this remarkable machine. Only an on-the-job demonstration can prove to you what the Prime Mover can mean in your own foundry. If you would like to see a demonstration and evaluate this machine yourself, we'll gladly arrange one through a member of our nationwide sales and service organization. For more information, sign this coupon and attach to your letterhead.

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THE PRIME-MOVER CO., Muscatine, Iowa

Please send me facts on the *Bell Prime Mover*. Who is the nearest distributor?

Name..... *Company*.....

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Unistage

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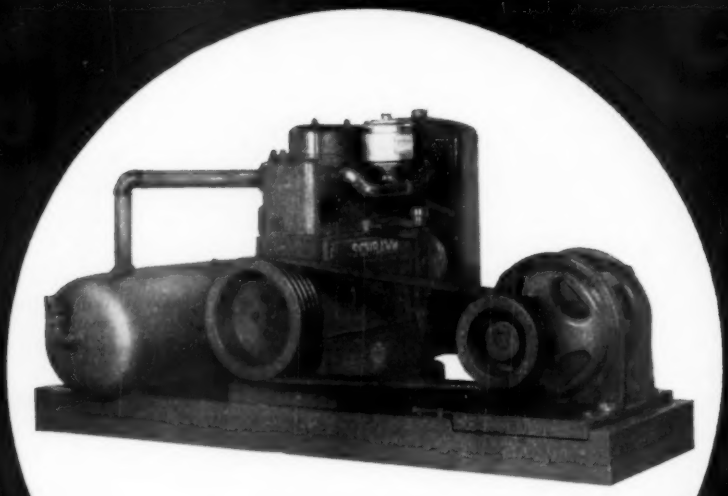

Model 105 *Unistage* Compressor on base with Motor, horizontal air receiver and cooling unit.

FOR PRODUCTION and MAINTENANCE
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SCHRAMM INC. offers a complete line of Industrial Compressors in sizes ranging from ... 2 to 600 cubic feet displacement ... Built and designed for continuous heavy duty service with a minimum of attention.

Available in "V" or Flat Belt Drive ... on base for belt drive from motor or engine ... or, with direct motor drive. No special foundation required ... can be bolted to any substantial floor.

Where running water is not available the SCHRAMM Cooling Unit will prove adequate under severest conditions. Accessories essential to any modern industrial installation can also be provided.

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Important Features

- Compact ... Easy to Install
- Mechanical Intake Valve
- Force Feed Lubrication
- 100% Water Cooled
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- En Bloc Construction
- Easy Accessibility
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CARBON IN STEEL

(*Continued from page* 87)

steady-rest of a grinder and held against the side of the wheel. The rectangular block was turned 180 degrees and the sample again held against the side of the grinding wheel (Fig. 4), thus obtaining two parallel surfaces. Care must be taken not to grind too hard and temper the steel.

The sample was tested on a Rockwell hardness testing machine using 60 kg weight and reading on Rockwell A scale. A number of samples of varying carbon analysis were taken, and the data to determine a curve were based on the average value of at least ten readings on each sample. The curve is shown in Fig. 1. The result can be obtained within less than two minutes. Usually four hardness readings are taken on each sample.

From Fig. 1, it is evident that the curve above 0.50 per cent carbon is almost vertical, therefore the upper practical limit of this method will be 0.50 per cent carbon. The method has proved to be accurate within ±.02 per cent carbon.

Acknowledgment — This project was carried out under the direction of H. H. Fairfield, chief metallurgist of William Kennedy & Sons Inc. The writer wishes to express his thanks to the management of the company for permission to publish this work and also to A. McMeekin and F. Kellam for their enthusiastic encouragement and useful suggestions.

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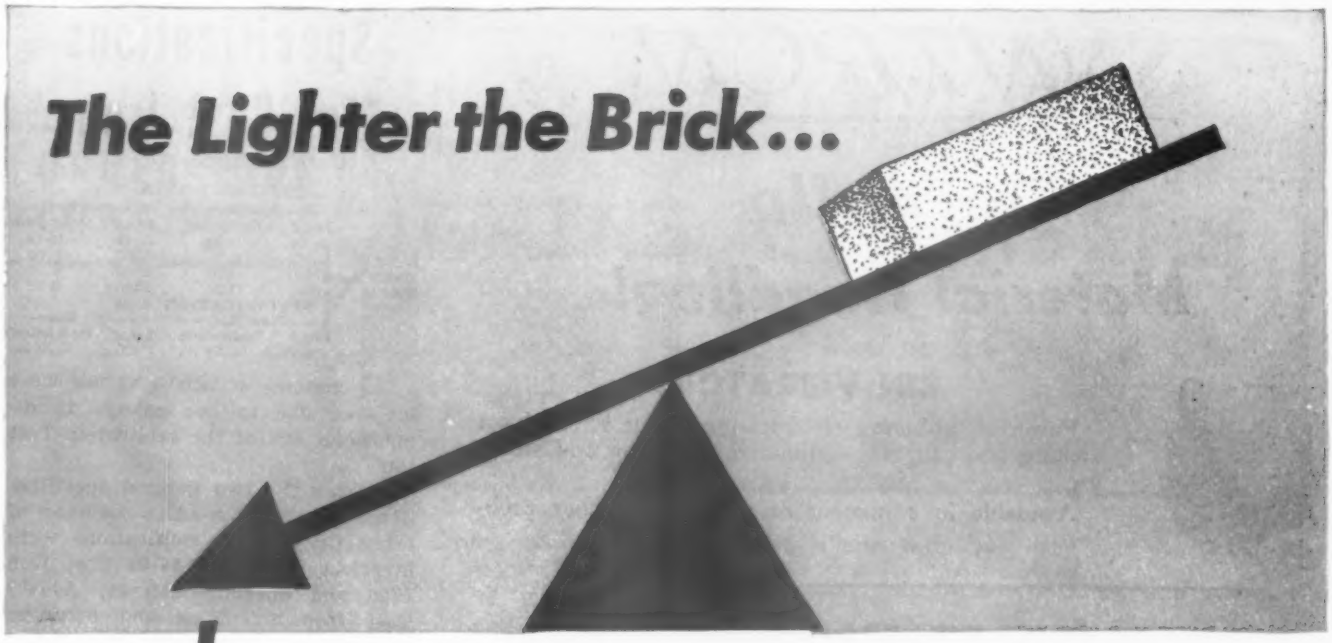

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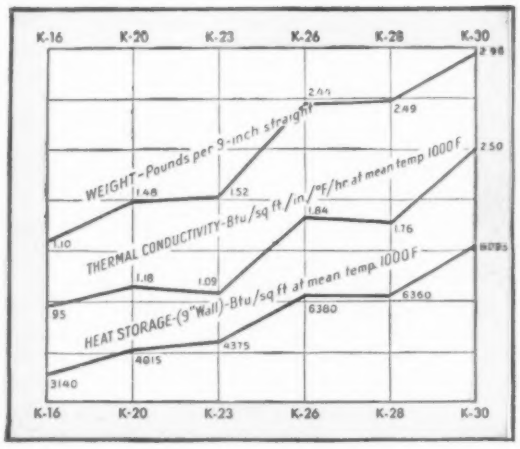

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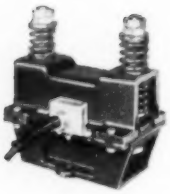

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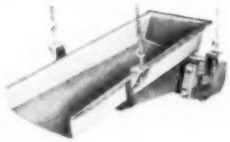

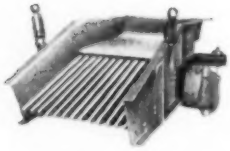

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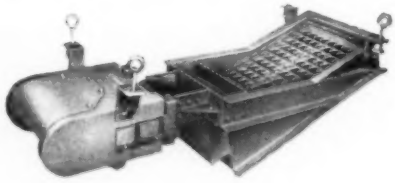

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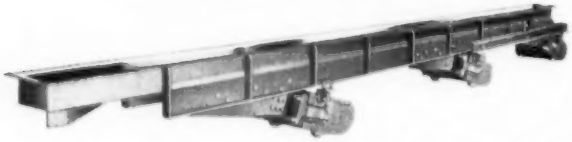

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Specifications for Cast Iron

(*Continued from page* 78)

SPECIFICATION A-48

	New Bar Load in lb.	New Bar Deflection in in.	Old Bar Load in lb.	Old Bar Deflection in in.
Light	1500	0.20	2500	0.10
Medium	1750	0.20	2900	0.10
Heavy	2000	0.20	3300	0.10

SPECIFICATION A-88

New Bar Load	New Bar Deflection	Old Bar Load	Old Bar Deflection
22.50 lb.	0.24 in.	3800 lb.	0.12 in.

No changes in tensile values were involved due to the change in dimensions, etc. of the arbitration Test Bar.

Besides the two general specifications A-48 and A-88, a number of other Gray Iron specifications were in effect in 1929: A44-04 Cast Iron Pipe and Special Castings; A74-29 Cast Iron Soil Pipe and Fittings; A45-14 Cast Iron Locomotive Cylinders; A46-24 Chilled Cast Iron Wheel.

In 1929 the committee recommended the adoption of a Tentative Specification for Valves, Flanges and Pipe Fittings, and this specification became a standard in 1930 under the designation A126-30.

Considerable work on correlation of Test Bar and casting was done during the late twenties and early thirties. R. S. MacPherran, a former chairman of Committee A-3, was chairman of Subcommittee XIV on Correlation of Test Bar and Casting. At the 1930 meeting of the society A. L. Boegehold presented a paper (as an appendix to the Committee A-3 report) on "Effect of Section Size on Physical Properties of Cast Iron." Mr. Boegehold's paper suggested a means of correlation between brinell hardness and strength. The writer discussed this phase and pointed out a commercial application. M. V. Healy also presented a paper on "Effect of Section on Properties of Cast Iron" as another appendix to the A-3 report.

In the 1930 report of Committee A-3 the writer presented a paper "A Comparison of Various Sizes of Test Bars Representing Cast Irons from Five Foundries." Dr. J. T. MacKenzie presented a paper on "Tests of Cast Iron Specimens of Various Diameters," while J. W. Bolton offered a paper on "Correlation of Cast Iron Test Bar and Castings by Volume-Surface Ratio." All of these papers were printed as appendices of the A-3 report.

In 1930 Committee A-3 through Dr. J. T. MacKenzie, chairman of Subcommittee XV on Impact Testing, started a comprehensive investigation into impact testing of cast iron. This work carried over several years and

(*Continued on page* 224)

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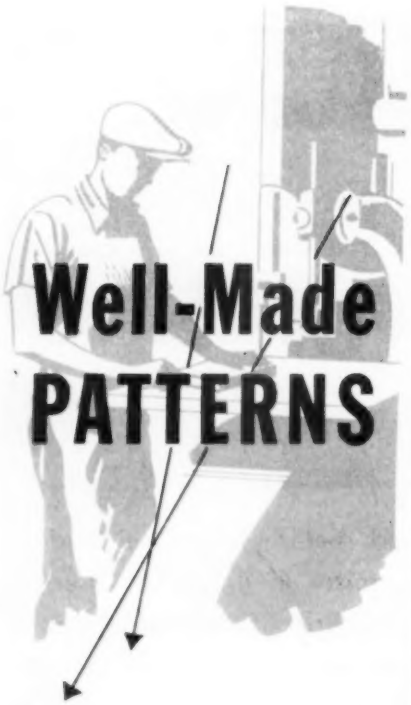

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(Continued from page 222)

a comprehensive and valuable report was made in 1933. The report covered the data on 25 sets of cast iron test bars.

The development of specifications indicates the need for research work along particular lines and in this way it encourages investigation and research. Committee A-3 was instrumental in encouraging research in the field of cast iron. The men who contributed greatly to the research programs during this period included the late R. S. MacPherran, Dr. J. T. MacKenzie, John W. Bolton, A. L. Boegehold and Willard Rother. The committee and the society were fortunate in having such an active group of workers.

In 1930 the Specification for High-Test Gray-Iron Castings A88-29 was revised by increasing the minimum transverse load from 2250 to 2500 lb and the minimum tensile strength from 28,000 to 33,000 psi. However, it was recognized that specifications for cast iron were lagging behind commercial practices in this country and abroad. For several years cast irons of considerably higher strengths have been available and reports from abroad indicated that 40,000 psi tensile strengths were not unusual.

Developments in this field were rapid as alloy irons and low-carbon irons were investigated. In 1932 Subcommittee VI on General Castings under J. W. Bolton recommended a Tentative Specification for Gray Iron Castings A48-32T to supersede two existing standard specifications, A48-29 and A88-31. The new specification, with very few changes, is the specification for gray iron castings in use today.

For the first time tensile strength became the primary item. The specification stated: "It is the purpose of these specifications to classify cast irons in respect to tensile strength." Provision was made for seven classes of cast irons:

Class No.	Minimum Tensile psi
20	20,000
25	25,000
30	30,000
35	35,000
40	40,000
50	50,000
60	60,000

Transverse test values were also shown and, by agreement between buyer and seller, the transverse test could be used for acceptance. The specification further provided for three sizes of test bars as follows:

Transverse Test Bar	Dimensions, in. Diam	Length	Distance Between Supports in Transverse Test
A	0.875	15	12 in.
B	1.20	21	18 in.
C	2.00	27	24 in.

Either separately cast tension test

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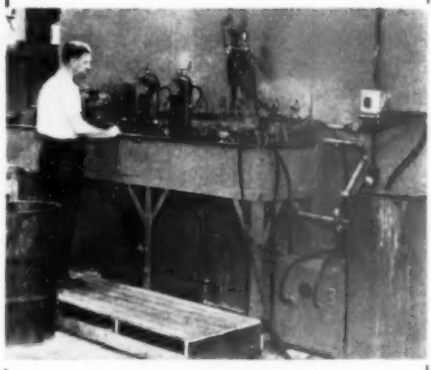

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bars could be used or tensile specimens could be machined from transverse test bars.

The specifications correlated casting and test bar by providing for controlling section of casting and size of test bar as follows:

Controlling Section of Casting	Test Bar	Nominal Diameter of test bar As Cast
0.75 in. max.	A	0.875 in.
0.76-1.10 in.	B	1.20 in.
1.11-2.00 in.	C	2.00 in.

It is interesting to note that at one step a change in ASTM specification was made, boosting the highest strength cast iron available from 33,000 psi minimum to 60,000 psi minimum.

In 1936 the tentative specifications were advanced to Standard under the designation A48-36.

Slight editorial changes were made in 1941 and 1946. In 1948 an editorial change was made so as to indicate clearly that the tensile provisions of the specifications are primary. In 1946 Dr. MacKenzie, upon invitation from Subcommittee VI, analyzed considerable data to determine possible correlations between brinell hardness and (1) tensile strength, (2) transverse strength and (3) impact properties. Dr. MacKenzie's paper was entitled "The Brinell Hardness of Gray Cast Iron and Its Relation to Some Other Properties." The paper was presented at the 1946 annual meeting of ASTM. This paper indicated some interesting data on brinell hardness-tensile strength relationships. (See THE FOUNDRY, October, 1946.) A chart plotting these data has been appended to Specification A-48 as Note 8. This action was taken at the 1949 meeting of the society.

In 1935 it developed that there was a need for a specification covering automotive gray iron castings and such a specification was developed in co-operation with a committee from the Society of Automotive Engineers. It was designated A159-35T. This specification was made a Standard in 1940. The SAE adopted practically the identical specification for publication in the *SAE Handbook*. Changes were made in this specification in 1947 and 1949.

Significance of Specifications—The ASTM has two general specifications for gray iron casting. One is the A48-48 Specification for Gray Iron Castings and covers those castings (not covered by other existing ASTM specifications) where strength is a major consideration. The other is A190-47 which covers light-weight and thin-sectioned castings in which appearance, machinability and dimension tolerances are primary considerations. Besides these two general

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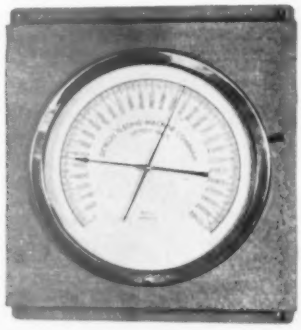

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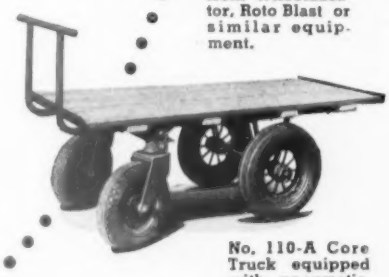

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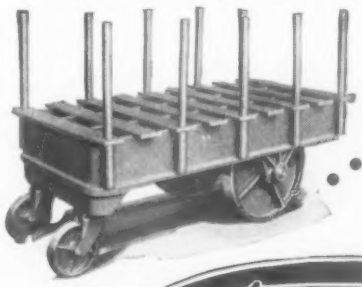

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specifications there are a number of specifications covering specific items or products such as:

A126-42—Gray Iron Castings for Valves, Flanges and Pipe Fittings. A159-47—Automotive Gray Iron Castings. A44-41—Cast Iron Pit-Cast Pipe for Water and Other Liquids. A74-42—Cast Iron Soil Pipe and Fittings. A142-38—Cast Iron Culvert Pipe. The range of specifications is such as to permit the engineer to select a specification which meets his needs.

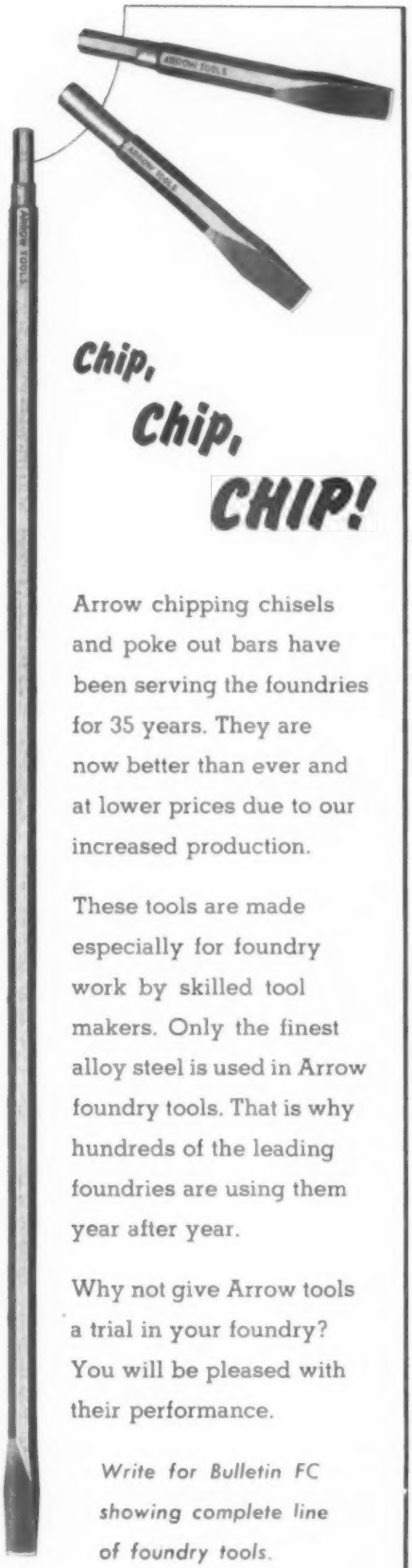
These specifications have been revised from time to time to suit better the needs of the user and producer of castings. Necessarily, specifications must follow the progress in an industry, but frequently the development of specifications stimulates such progress. Furthermore, these specifications furnish valuable information concerning the material to be supplied. They permit the acceptance or rejection of castings on the basis of meeting definite requirements.

Uses and Abuses—Assuming there are adequate and proper specifications, there is still a job to be done, and it is most important. That job is to educate the buyer and seller to the proper use of a specification. An engineer looks at Specification A-48 and finds he can obtain castings in various classes in respect to strength, ranging up to 60,000 psi minimum tensile. He assumes that a Class 40 iron is better than a Class 30 iron, although Class 30 iron will give him all the strength required for the part. If the Class 40 iron is specified, a mistake has been made because such material is usually more costly and more difficult to machine. If the foundryman knows that the wrong class has been specified, he should call it to the attention of his customer.

During the last war there were many cases where higher strength irons were specified but were not needed. There was an erroneous assumption that if 30,000 psi tensile is good, then 50,000 psi must be better. Such a specification resulted in higher costs, lower production and waste of alloying materials. In many cases it was found necessary to change these specifications, changes made on the basis of experience. The foundryman should work closely with his customer to see that the proper material is specified.

In other cases wearing properties may be the principal item and yet high strength is specified. Frequently, the desired results can be obtained by reducing strength requirements and specifying the desired structure and hardness range.

Alloying elements have their proper place in cast iron and fulfill a definite need. Alloy cast irons may be



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required because of wear resistance, strength, machinability or heat treatment. However, in many cases alloying elements are specified and are not needed. Here again, the foundryman can perform a distinct service for his customer in pointing out the essential facts.

There is a definite trend toward more machinable castings and frequently this is accomplished by a suitable heat treatment. The heat treatment (stress relief or annealing) results in a lower and more uniform hardness range and better machinability.

Castings do fail in service and it is necessary to determine the cause of failure before a change in specification is made. Usually, the answer is not to go to a higher strength cast iron. In some cases, it may be that failure has resulted from a high stress concentration, and a slight change in design may be more effective than the use of stronger material. In other cases, unsoundness is the cause, and this should be rectified through improved foundry practice or change in design, or both.

Specifications for gray iron castings serve a definite need in industry and they should be used intelligently to obtain maximum performance with economy.

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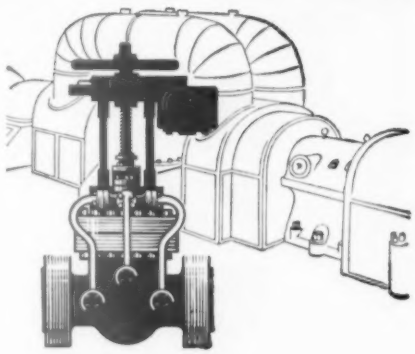
National Foundry Association, 120 South La Salle St., Chicago 3, has contracted with the Continental Assurance Co. to furnish group insurance, hospitalization, and medical and surgical benefits to small foundries which may be unable to qualify for group insurance because of size.

In most states an employer with fewer than 25 employees is not eligible for group insurance, hospitalization, and other benefits. Under the NFA plan these services now will be made available to foundries regardless of size. The plan may be contributory or noncontributory, and may cover the individual workman, or the workman and his dependents.

The master contract provides for four types of coverage, ranging from a minimum of $1000 death benefit, $350 hospital benefit and $200 surgical benefit to $3000 death benefit with comparable increases in other features. A similar plan is now in effect in a number of leading American industries, and the benefit and value of the project is well established.

The American National Bank & Trust Co. of Chicago has been selected trustee to co-operate with a committee of trustees from the NFA.



high pressure and high temperature

Not so many years ago, designers shunned gray iron for high pressure and high temperature usage. This is all changed — such castings are now freely specified.

Molybdenum has made possible this type, and many other types, of high quality cast iron.

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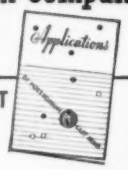

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With the Editors

WHILE the printers were busy putting the finishing touches on this issue, the advertising and editorial departments were hard at work on the May, Preconvention number. That special issue will provide an excellent preview of what may be seen and heard at the Foundry Show and Annual Convention in Cleveland, May 8 to 12. Jack Lathrop reports that a large number of foundry equipment and supply manufacturers and dealers are taking advantage of that issue to give an advance picture of their latest developments which will be shown at the Cleveland Public Auditorium. The editorial pages will present full details of the convention program, and the special features being planned by committees of the Northeastern Ohio Chapter of AFS, under the general chairmanship of Managing Editor Bill Gude. Artists Don Cadot and Robin Allen promise a striking looking presentation. The Preconvention issue also will carry the large usual number of special articles and regular features presented in each issue throughout the year. The May issue should reach you a few days earlier than usual—so watch for it.

Three excellent colored photographs showing the annealing furnaces, pouring station and office of the Albion Malleable Iron Co., Albion, Mich., are reproduced in the advertisement of the Pittsburgh Plate Glass Co. in the March issue of *Fortune*. A caption "Albion Malleable Iron Foundry utilizes energy in color to make its huge 62-year-old plant a more efficient, more attractive and safer place for its workers." This surely is good publicity for the company as well as for the foundry industry. Congratulations to Collins Carter, Tom Lloyd and all the workers at Albion.

The month which ended with press time on Mar. 15, found the editors following a heavy travel schedule in the interest of news and feature material for THE FOUNDRY. Bill Gude, Ed Bremer, Bob Herrmann and the editor were in Cincinnati Mar. 10-11 for the successful third annual Ohio Regional Conference staged at the Netherland Plaza by the five Ohio Chapters of the AFS.

During the month, Westinghouse Electric Corp. invited a number of editors of the four Penton publications to a 2-day inspection trip of various departments in the Pittsburgh area. Bill Gude, Pittsburgh Editor Joe Sullivan, and the editor enjoyed especially a tour of the Trafford City foundry personally conducted by Mike Kellner.

Bill Gude spoke before the Michiana Chapter of AFS in Michigan City, Ind., on Mar. 7. The editor talked at a meeting of the St. Louis District Chapter of AFS on Mar. 9, and also visited in Chicago, Detroit and Washington.

Don R. Ogg, foreman of cleaning and shipping room, H. P. Deuscher Co., Hamilton, O., who says "every key man in that organization reads and appraises THE FOUNDRY magazine," has sent along the following foundryman's prayer, which appeals to us as a good job:

> O Lord, you have placed me in your foundry of life on this earth. Help me mold my life according to your blueprint. Let me faithfully put in my full hours and days there giving your big orders top priority. With your divine assistance my thoughts, words and actions of each day will be melted down in the furnace of your great love so that you and I together can run off a good heat and puddle it without flaw in the pattern you have designed.
>
> Heavenly Father, I hope to chip off the burrs and grind the rough spots so that you will gladly accept my life when it is shipped out of here to your heavenly place of business. Give aid, dear Lord, to a poor workman that needs you lest he pour carelessly and spill some of his doings uselessly, lest he grow sloppy and mold with a flaw or grow lazy in chipping and grinding. Instead, be ever near me to guide and direct that I may earn my full salary of a happy life with you forever. Amen.

In checking over the summary of a Productivity Convention held recently by the British Steel Founders' Association, it is interesting to note that the matter of restrictive practices was mentioned by practically every speaker. It was pointed out that these practices were instituted in former years in the hope of safeguarding the skilled worker from unemployment and preventing the utilization of cheaper labor on processes regarded as the province of skilled men. While the representatives present realized that the removal of these practices would not be easy, it was admitted that a change in attitude is necessary if man-hours per ton are to be lowered and the future of the industry assured.

For some reason, this discussion emphasizes the fallacy in the thinking of some labor leaders in this country.—F.G.S.

HANDLING MATERIALS

(*Continued from page* 95)

large gray iron foundry, recovers 5 tons of iron from waste sand every 24 hr. It saves 48 man-hours per day and eliminates the need for two pickers and one shoveler each shift because the iron is discharged to waist-high hoppers instead of on the floor. Self-cleaning of the magnet is accomplished by a belt which travels across the face of the magnet at right angles to the direction of travel of the sand-carrying belt. Magnetic attraction holds the iron to the underside of the cross belt until it is carried beyond the magnetic zone and released into the hopper shown in the right of Fig. 13. No iron can accumulate on the magnet to interfere with its effectiveness. One company offers rectangular magnets in standard sizes ranging from 12 to 60-in. wide and up to 40-in. long. Longer models in special designs are available. Faster sand carrying belt speeds require longer magnets.

Magnetic pulleys are self-cleaning and are available in electromagnetic and permanent magnet types, in a wide range of diameters, widths and capacities. Permanent magnet pulleys are recommended where the maximum depth of material traveling over the belt is less than 2 in., and magnetic material size is not less than ⅛-in. Electromagnetic pulleys are recommended for burden depths over 2 in. or where the magnetic particles are extremely small. Fine magnetic particles cannot be cleaned from the face of a permanent magnet because of its permanency. The result is excessive belt and pulley wear. Electromagnets can be de-energized and cleaned completely.

Movement of castings by overhead trolley conveyor line away from the shakeout is shown in Fig. 16. The overhead trolley installation at this foundry has a total length of about 3000 ft and extends from the shakeouts to the cleaning and inspection departments and finally to the shipping dock.

The mobile swing boom crane shown in Fig. 14 is of 20,000-lb capacity and is equipped with front wheel drive and rear wheel steering. It will move box loads of small cast-

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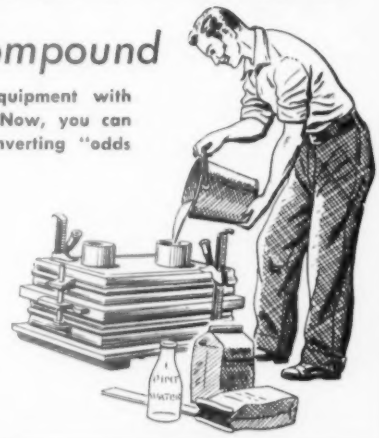

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■ Kelsey-Hayes Wheel Co., Detroit, installed an 85-foot belt conveyor under three shakeouts to handle 200-degree sand and **red hot** scrap.

In 8 months, K-H burned up two rubber belts. Initial cost was $1,600 each. Shutdowns were frequent, operating costs excessive. Every time a piece of red hot scrap fell on the belt, it burned a hole that had to be patched immediately.

Installed at a cost of $2300, Imperial's SUPER-INSULATED SAHARA belting lasted 8 months and 8 days on the same conveyor. Saving in initial cost was $900 for the 8-month period. Maintenance costs were nil: not one piece of red hot scrap burned through the Imperial belt.

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ings or large single castings to and from the shakeout. Because of its mobility and capacity it is a versatile machine which may be used for lifting and transporting jobs in all phases of foundry operation. It may be powered with either gasoline or diesel engine. One engine furnishes the power for travel, forward or reverse, and for all crane operations. Load line hoisting, boom topping, and boom swinging with full load suspended from the hook, may be performed independently or simultaneously. One man controls all operations from the driver's seat. The crane may be equipped with pneumatic or solid rubber tires and 9 to 37-ft booms or telescopic booms adjustable in length.

Sources of Illustration

Fig. 1—Whiting Corp., Harvey, Ill.
Fig. 3—Ingersoll-Rand Co., Phillipsburg, N. J.
Figs. 2 and 4—Robins Conveyors, Inc., Passaic, N. J.
Figs. 5 and 7—C. O. Bartlett & Snow Co., Cleveland.
Figs. 6 and 8—Jeffrey Mfg. Co., Columbus, O.
Figs. 9 and 10—National Engineering Co., Chicago.
Fig. 11—Imperial Belting Co., Chicago.
Figs. 12 and 15—Link-Belt Co., Chicago.
Fig. 13—Dings Magnetic Separator Co., Milwaukee.
Fig. 14—Silent Hoist & Crane Co., Brooklyn, N. Y.
Fig. 16—Simplicity Engineering Co., Durand, Mich.

Book Review

Foundry Science, by Dr. Harry A. Schwartz, cloth, 286 pages, 6 x 9 in., published by Pitman Publishing Corp., New York. Price $6.50.

Dr. Schwartz, manager of research, National Malleable & Steel Castings Co., Cleveland, and one of the best known foundry metallurgists, has undertaken to interpret the findings of the scientist to the industrial technologist. Perhaps the best description is found in the comment of Prof. Wylie J. Childs, Lafayette College, who stated: "The author has done a fine piece of work in correlating the knowledge derived from many different branches of science with its bearing on the foundry. It is certainly the first time that such an attempt has been made to bring all these facts and principles into one text."

Dr. Schwartz feels that progress in the foundry depends upon the application of scientific principles. These begin with the structure of matter in terms of electrons and protons and in the terms of forces which hold atoms together as molecules. It is of importance to know the rules which govern equilibrium between liquids and solids during freezing, or within a solid after it has frozen. Electrical conductivity, thermal conductivity, specific heat, etc. are all related to

the structure of a crystalline solid, and hence, to each other. This provides the groundwork for the study of equilibriums.

According to the author, the temperature within a furnace depends upon the rate of heat liberation by combustion or otherwise, on flue gas compositions and the heat loss through furnace walls. In the case where a furnace is charging, this temperature further depends upon the thermal diffusivity of the substances being heated or cooled. High temperatures are measurable by the application of the radiation laws.

The carbon content of ferrous alloys is determined by methods of manufacture; the absorbing of carbon in the blast furnace or cupola and its elimination in the steel melting furnace and to a less extent, in the air furnace.

The microstructure of a frozen iron-carbon alloy depends, aside from its composition, upon cooling rate. With sufficiently high carbons, graphite can form in various shapes while the eutectic, or last freezing liquid, solidifies. Furthermore, carbon can be separated as graphite nodules by heat treatment well below the freezing point. Alloying elements affect the properties of ferrous alloys mainly through changes in the carbon-iron systems. Molds are silica sand held together by coatings of clay minerals, which cohere by absorbing water.

The filling of the mold follows the same rules of fluid mechanics which would apply to the flow of any liquid. Feeding is merely an example of having sufficient liquid metal available, properly located to supply all of the shrinkage in the casting itself.

In the concluding chapter, Dr. Schwartz indicates that foundry results are best supervised by statistical methods which show a departure from the normal working conditions as soon as it occurs.

Correction

A number of safety awards earned by Decatur Casting Co., Decatur, Ind., were illustrated and described in the February issue of THE FOUNDRY on page 144. The company had featured the display illustrated at the annual Decatur Street Fair held Oct. 10-15. The display showed, with pride, the numerous awards for extended periods of company operation without a lost-time accident, indicating that the company is a safe place in which to work. THE FOUNDRY regrets that it erroneously reported the Decatur Casting Co. as being located in Decatur, Ill., instead of Decatur, Ind.

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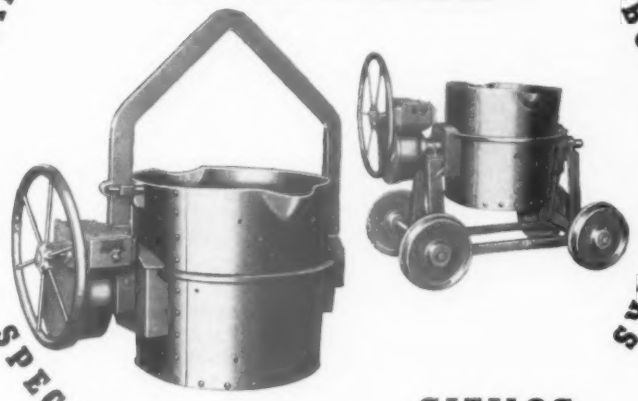

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ALUMINUM ALLOYS: Federated Metals Division, American Smelting & Refining Co., Dept. AE, 120 Broadway, New York 5—Booklet, "Aluminum Casting Alloys," discusses the metallurgy of aluminum casting alloys with explanations of how these alloys are affected by copper, silicon, magnesium, manganese, iron, zinc, nickel and titanium. Nominal compositions, mechanical properties, and industrial properties are listed in specifications covering 45 sand, permanent mold and die casting alloys.
For More Details Circle No. 90—Page 207

ADJUSTABLE SPEED: General Electric Co., Schenectady 5, N. Y.—Five new publications on adjustable speed are offered. The first, "Adjustable Speed," summarizes benefits of properly applied adjustable speed. The others: "Adjustable Speed ACA Motors," "Speed Variator," "Electronic Speed Variator," and one describing an electronic motor control system for adjustable speed drives, contain descriptive and application data for the specific equipment involved.
For More Details Circle No. 91—Page 207

LATHE OPERATION: South Bend Lathe Works, 425 East Madison St., South Bend 22, Ind.—Volume 1, edition 49, of *How to Run a Lathe* deals with the care and operation of a screw-cutting lathe. Purpose of the book is to aid apprentices and students in understanding operation fundamentals of a modern screw cutting engine lathe. Spanish, Portuguese and French translations of the book are available at 25 cents each.
For More Details Circle No. 92—Page 207

RADIANT TUBE HEATING: Holcroft & Co., 6545 Epworth Blvd., Detroit 10—Bulletin on radiant-tube heating of controlled-atmosphere heat treat furnaces discusses and illustrates the flame characteristics required in fuel-fired tubes; defines the burner performance features essential to efficient operation; and describes a quick-change combination burner designed for gas, oil or electric heating.
For More Details Circle No. 93—Page 207

SAFETY EQUIPMENT: Willson Products Inc., 233 Washington St., Reading, Pa.—Safety equipment catalog provides product information on the company's line of eye and respiratory equipment plus a fund of technical and reference material to facilitate selection of the proper type and style of equipment for a specific occupational hazard. Information on the use and care of such equipment also is included.
For More Details Circle No. 94—Page 207

WALL CHART: Tempil Corp., 132 West 22nd St., New York 11—Wall chart, entitled "Basic Guide to Ferrous Metallurgy," shows the working characteristics of steels in temperatures from minus 300° F to 2900° F. Temperature ranges are shown in 19 colors approximating the characteristic hot-body radiant hues. Metallurgical terms are defined and change in grain size with temperature is shown.
For More Details Circle No. 95—Page 207

BUCKETS: George Haiss Mfg. Co., division of Pettibone Mulliken Corp., Park Ave. at 141st St., New York 51—Bulletin H 849 describes and illustrates power wheel clamshell buckets for rehandling materials. Specification tables on the various sizes are included.
For More Details Circle No. 96—Page 207

STRAIN GAGES: Baldwin Locomotive Works, Philadelphia 42—Bulletin 279-A tells how to select and use SR-4 bonded resistance wire strain gages in stress analysis. Bulletin 279-B gives detailed procedures for attaching SR-4 resistance wire strain gages to surfaces.
For More Details Circle No. 97—Page 207

CASTING ALLOYS: Precision Metalsmiths Inc., 6511 Cedar Ave., Cleveland 3—Manual of data sheets lists the chemical composition, essential mechanical and physical properties, heat treatment, and other detailed information on 80 investment casting alloys, both ferrous and nonferrous.
For More Details Circle No. 98—Page 207

WIRE ROPE: Macwhyte Co., attention R. G. Diehl, 2906 Fourteenth Ave., Kenosha, Wis.—Folder 49-30 describes 133 different sizes and types of stainless steel and Monel metal wire rope. Typical uses for each rope are listed and the various types available are described and illustrated.
For More Details Circle No. 99—Page 207

CRANE CONTROL: Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.—Bulletin 72 describes the company's simplified crane control system which employs small master switches and solenoid starters permitting the operator to control all crane motions by finger-tip levers.
For More Details Circle No. 100—Page 207

ELECTRONIC CONTROLS: Photoswitch Inc., 77 Broadway, Cambridge 42, Mass.—Booklet presents 45 case studies of the application and operation of electronic controls in industrial applications. Included is a control for automatic pouring of molds.
For More Details Circle No. 101—Page 207

MOTOR DRIVES: Reeves Pulley Co., 1225 Seventh St., Columbus, Ind.—Bulletin M-4917 illustrates and describes the company's new line of fractional horsepower motor drive

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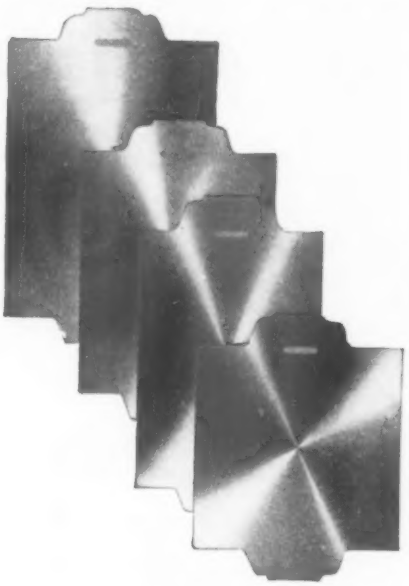

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For More Details Circle No. 102—Page 2C7

HYDRAULIC SCALE: Hydroway Scales Inc., 20624 West Eight Mile Rd., P. O. Box 176, Detroit 19—Illustrated folder describes the company's hydraulic scale which may be hung on standard crane hooks to weigh loads as the loads are lifted.
For More Details Circle No. 103—Page 2C7

ANALYZER: Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh 8—Bulletin DZ-4 describes an infrared gas and liquid analyzer for measuring atmospheric contamination and for precise process control.
For More Details Circle No. 104—Page 2C7

MOVING?—To make sure you get your FOUNDRY promptly, please send advance notice of any change of address directly to us.

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ROLLING DOORS: Cornell Iron Works Inc., 36th Ave. & 13th St., Long Island City 6, N. Y.—Catalog Z-27 describes and illustrates rolling steel doors and grilles. Specifications are listed for the various types.
For More Details Circle No. 105—Page 207

COPPER ROOFING: Revere Copper & Brass Inc., 230 Park Ave., New York 17—Master Specification 100 contains specifications for copper roofing and sheet metal work in building construction.
For More Details Circle No. 106—Page 207

FOUNDRY PRACTICE: Foundry Services Inc., 280 Madison Ave., New York 16—Booklet 97 discusses various phases of foundry practice including permanent mold casting, and describes products sold by the company.
For More Details Circle No. 107—Page 207

AIR DRIER: Gasflux Co., 198 Wayne St., Mansfield, O.—Leaflet describes a cartridge type drier for removing moisture and oil from air lines.
For More Details Circle No. 108—Page 2C7

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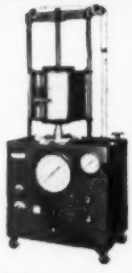

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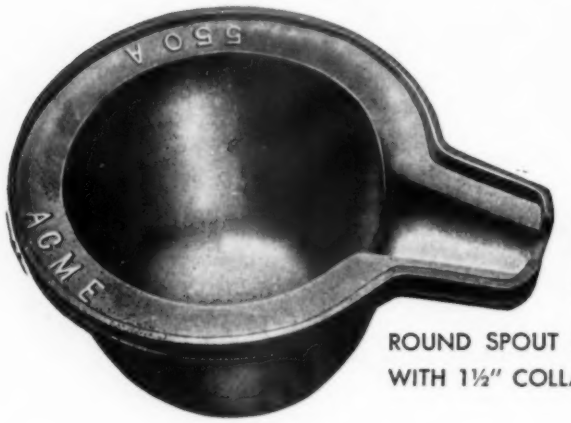

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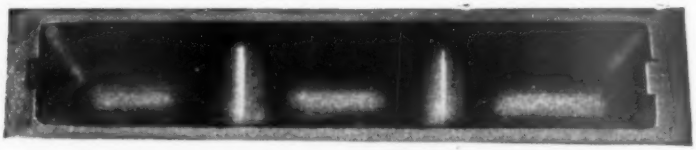

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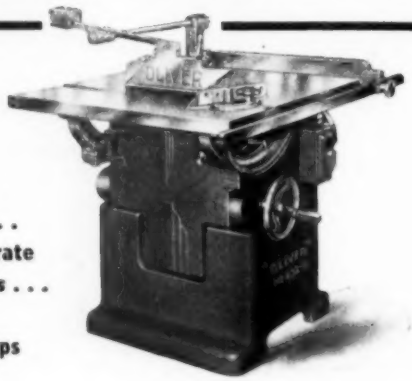

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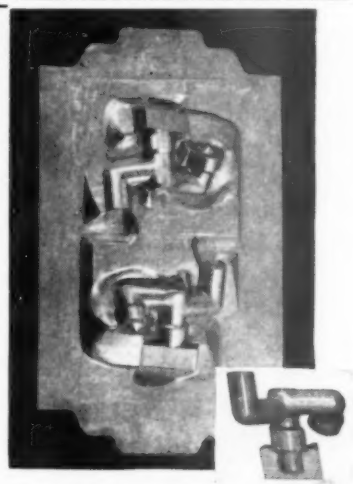

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Farmers Bank Building, Pittsburgh 22, Pa.

BLAW-KNOX FOUNDRY BUCKETS

DUST PROTECTION

YOUR WORKERS WILL WELCOME AND WEAR!

The New **FLEX-A-FOAM FILTER MASK**

The most remarkable advancement in dust-type respirators ever made!

NEW *FEATHER-LIKE WEIGHT*... weighs exactly one ounce.

NEW *SNUG-FITTING COMFORT* adjusts itself with comfortable snugness to every face size.

NEW *FILTERING EFFICIENCY*... purifies the air of non-toxic nuisance dusts as small as 1/25,000 of an inch.

NEW *BREATHING COMFORT*... it's easier to breathe and talk through than an ordinary pocket handkerchief.

THE LOWEST-PRICED *QUALITY* RESPIRATOR ON THE MARKET TODAY!
Trial Sample $1.50 Post Paid

Write TODAY For Descriptive Circular

THE GOGGLE PARTS CO., INC.
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COLOR YOUR CORE SANDS

Modern foundries have found it practical to color their various grades of core sands. This eliminates guesswork and assures the proper use of the required type of core sand for the particular job at hand.

Our laboratories have developed a line of special dyes in a range of colors that have been carefully tested and found suitable as well as economical.

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EATON CHEMICAL AND DYESTUFF COMPANY
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Canadian Branches: Windsor and Toronto

Use Self-Dumping Containers

SIMPLE — SAFE — SPEEDY
MATERIAL HANDLING

Step-Up PRODUCTION 50% with ROURA Self-Dumping HOPPERS

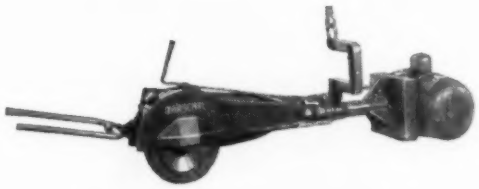
Only ROURA Has the Exclusive Instant Release (Patent Pending) Handle

Handling wet or dry, hot or cold, bulky materials quickly and easily, the ROURA is simple to operate—only one man is required for distributing and unloading—and he does this in much less time than ordinarily required under old-fashioned manual methods. Thousands of Roura Hoppers (which fit any standard fork or platform lift truck) are in constant daily operation, serving and saving for such firms as Owens-Illinois Glass, Corning Glass, National Fireproofing, General Motors, Ford, Chrysler, American Brake Shoe, General Electric, Westinghouse, Western Electric, American Steel Foundries, International Harvester, John Deere, etc.

By a simple lift of the exclusive release handle, the ROURA HOPPER dumps, rights and locks itself securely. Sizes — ½, ¾, 1, 1½ and 2 cubic yards; the ROURA HOPPER can also be designed for flat trucks and in other sizes to meet specifications. Also, it can be equipped with special flanges that permit stacking to desired tiers for storage or future distribution of materials — conserving valuable floor space. Priced below all competition, the ROURA will quickly pay for itself many times over.

Write today for detailed brochure.
"You Can Save 50% Labor-Time"

ROURA IRON WORKS, Inc.
1407 Woodland Ave. Detroit 11, Mich.



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Size for size, Marschke Swing Frame Grinders are *heavier* than any other machine on the market. This extra weight is no accident—it's there—in the right places—to eliminate *vibration*, the "wheel eater". Marschke swing frames give you better two-way balance . . . smoother spindle rotation: bearing seats are *precision ground and honed* to assure perfect spindle alignment and bearing fit.

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MOULDER CORPORATION
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"Lancaster" Mixers for Foundry Sands

Put More Valuable Minutes . . . In Every Man Hour

The exact and controlled conditioning of sand formulas by "Lancaster's" balanced mixing-mulling action puts more valuable minutes into every man-hour of the foundry production schedule. Core-sand mixes are developed to desired strength and permeability in any formula range. Binder or oil content can be reduced. And—"Lancasters" are "power-misers"—produce at maximum capacities with low power costs. Write today for catalog information . . . no obligation.

POSEY IRON WORKS, INC.
Brick Machinery Division
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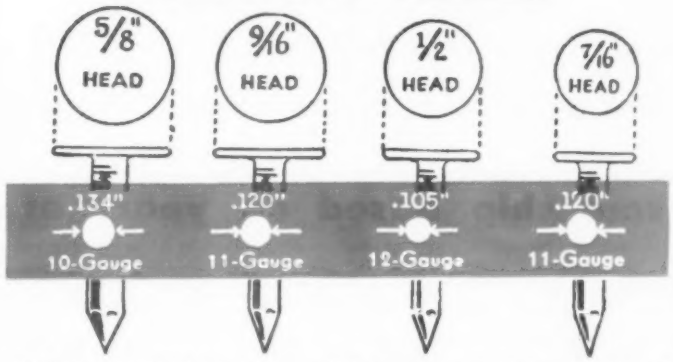
ANGELL . . . PROVEN PRESSURE PROOF CHAPLETS

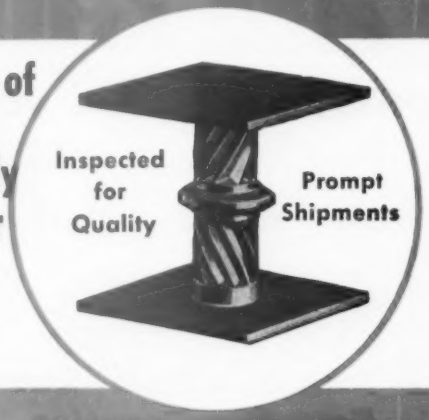
Producers of SUPER HEAD FOUNDRY NAILS



5/8", 9/16" & 1/2" Heads available up to 3 inches in length

Standard Foundry Nails available in all lengths.

All styles of Chaplets Accurately Made for Better Castings



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Smelted from Superior quality lake ores, high grade metallurgical coke and limestone, using our own local No. 1 Sharon Seam coal.

HIGH SILICON IRON JISCO

A "blend" with JISCO is sound metallurgy.

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Fastest possible dressing action on snagging wheels and other large or coarse wheels calls for Desmond Huntington dressers. Five types of handles and three sizes of cutters meet the full range of requirements. Write The Desmond-Stephan Manufacturing Co., Urbana, Ohio, for the complete Desmond Catalog No. 45F.

Desmond
DRESSERS & CUTTERS

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When you decide your source of supply for Foundry Facings. Bloomsbury Quality offers—

1 **An assured quality that Guarantees Clean Castings.**

2 **A better value due to water power facilities and small town operation.**

3 **Experienced Service Salesmanship based on years of Foundry Practice.**

Our First Customers—since 1882—are still with us. Why not discover "Why"? Free samples to prove the point if you will only discuss your problems with us.

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OPERATE AIR TOOLS WITH

CLEAN DRY AIR

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USE MURPHY SEPARATORS

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Employing four positive principles of separation, the Murphy "Type A" Separator carries a money-back guarantee to *deliver* clean, dry air to point of use. Completely automatic separation and ejection. No moving parts to receive wear. No filters to renew. Requires neither attention nor maintenance. Install it . . . and forget it; it's *guaranteed*. Write for literature and prices.

GUARANTEED COMPRESSED AIR PRODUCTS

AFTERCOOLERS • SEPARATORS • STRAINERS • TRAPS
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Moisture Elimination Up To 3000 Pounds Per Square Inch

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Neff & Fry Storage Bins keep their contents safe from fire, storm, exposure, collapse, and theft. This is due to structural advantages which have proved their superiority in actual performance for 36 years.

The unique feature of N. & F. Storage Bins is the Super-Concrete Stave. With beaded and grooved edges and diagonal points, each stave interlocks with six adjoining ones. Horizontal joints are saw-toothed. Galvanized steel hoops around the joint areas impinge directly upon all the stave points.

The staves are formed under great pressure. They are dense in texture and have such high compression strength that superstructures are frequently built on top of N & F. Bins without extra supports.

Shown in the photo is a 24-ft. dia. x 60-ft. high N. & F. Bin erected for Speer Carbon Co., Punxsutawney, Pa. It is used for storing calcined coke. Capacity is 475 tons.

Before you reach any conclusions on vertical storage structures, be sure to get all the facts about N. & F. Bins. Complete information will be gladly sent upon request.

THE NEFF & FRY CO.
157 East Central Avenue
Camden, Ohio

NEFF & FRY STORAGE BINS

"BABY" THOSE CORES

with CMD

PNEUMATIC CORE TRUCKS

The resilient construction of CMD Pneumatic Core Trucks absorbs all shocks and bumps—protects cores from costly chafing and breaking, carries them as gently as a baby carriage. Pneumatic tires and *exclusive* inner coil springs in the upright supports assure fast, safe transporting of cores from the core room to the foundry.

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Write today for FREE circular 450-F on CMD Core Trucks, Barrows and other foundry specialties.

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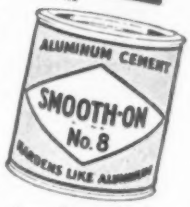
For Surface Blemishes in ALUMINUM CASTINGS

Have you used the Smooth-On Foundry Cement made especially to correct blow holes, porous and rough spots, dents and other unsightly but harmless surface defects in otherwise sound *aluminum* alloy castings?

Applied like the widely used Smooth-On *Iron* Foundry Cement, Smooth-On No. 8 *Aluminum* Cement fills in evenly, hardens quickly, matches perfectly. Stays in place, too, for it expands slightly as it sets.



Smooth-On No. 8 Aluminum Cement comes in 1-and 5-lb. sizes. 1 lb. will fill 17 cu. in. Order it by NAME AND NUMBER from your supply house. If they haven't it, write us. If you have not yet discovered Smooth-On No. 8, ask us for

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Do it with SMOOTH-ON
No. 8 ALUMINUM CEMENT

SERVING YOU
in
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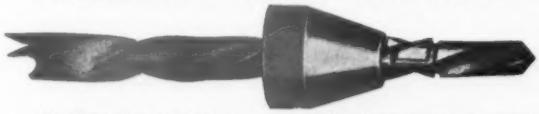
INSERTING DRILL



• Uniformity of holes • Faster insertion of vent
• Correct Depth

CORE BOX VENTS

DEEP HEAD		SHALLOW HEAD		MESH
Wide or Narrow Slots		Wide or Narrow Slots		
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VENT CLEANER

for Cleaning Slots
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Magnified 40 times, this photograph shows the uniform quality of American Shot and Grit . . . your best buy for economical blast cleaning.

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MIX CORE SANDS MOLDING SANDS CUPOLA PATCH MIXES

IN **4 MINUTES** FLAT

THEN *DISCHARGE 'EM* IN THIRTY SECONDS

Lower Costs? **YOU BET!**

It's the new PERFECT MIX MULTIMIXER that kneads, as it turns, as it rubs to give you the most modern equipment of its kind on the market today for better cores—better castings. Sizes from 3 to 60 cu. ft. Hundreds of units in operation. Direct motor drive—no clutch—no belts. A real time saver—cost cutter.

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HARD CHROMED • PORTABLE PNEUMATIC TOOLS

DO MORE WORK AT LESS COST

because they deliver more power per cubic foot of air consumed, are light in weight for easier maneuverability and they retain their new tool power longer.

ARE PREFERRED BY OPERATORS

because they are lighter in weight, better balanced and designed to reduce shock and be free from vibration.

IF YOUR PROBLEM INCLUDES

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SALES • SERVICE • STOCK • COAST TO COAST

CUT core BAKING TIME 50%

WITH G-E 12300 FAST-CURING RESIN CORE BINDER

You'll find you can reduce baking times by 50% and more by using General Electric's G-E 12300 phenolic resin core binder.

HERE'S PROOF!

1. A 3-lb. half-core for differential housings: Former time—2 hrs. With G-E 12300—¾ to 1 hr. Reduction—50 to 65%.

2. A 10-lb. truck axle core: Formerly—two passes through tower oven. With G-E 12300—one pass only. Reduction—50%.

3. Tensile test cores: Former time to achieve maximum strength—40 min. With G-E 12300—16 min. Reduction—50%.

Besides reduced baking time, G-E 12300 offers (compared with conventional oil binders) lower cleaning costs, fewer casting rejects, and less breakage, because of its excellent collapsibility, shakeout, high permeability and low gas evolution.

For more information on how G-E 12300 can improve your core room technique, write to Section E1, Chemical Department, General Electric Company, Pittsfield, Mass.

You can put your confidence in

GENERAL ELECTRIC

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NO. 22 PORTABLE

Head and table adjustable for height. Takes flasks up to 12" by 24". Width inside to inside of wheels 26". Table size, 12" by 16". Pressure plate size, 8" by 12". Set-off benches included. Rust-resistant, attractive. Aluminum enamel finish.

Moline Molding Machines are available in five sizes. Each is designed to deliver faster production, fewer rejects, a better profit. Ask for catalog and prices.

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IRON WORKS
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ESTABLISHED 1878 • OVER SEVENTY YEARS OF SERVICE

USE THE IDEAL FUEL FOR . . .

DRYING MOLDS . . . PREHEAT CASTINGS . . . ON MOLTEN METALS . . . RECARBONIZE STEEL . . . MELT SOFT METALS

● The long-burning, uniform, penetrating heat of Ford Charcoal Briquets makes it the ideal fuel for an increasing list of foundry uses. And it's portable—to save you valuable time, space and money. Order today, and write for interesting information on use and equipment:

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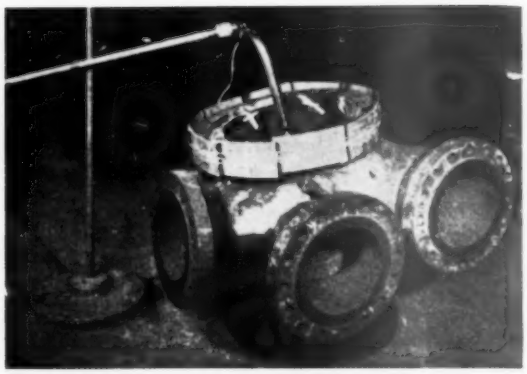
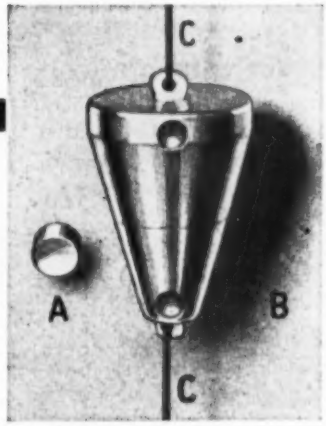
BUY, RENT OR LEASE OUR RADIUM RADIOGRAPHY KIT

and make a short cut to more productive and economical foundry practice





The apparatus is as simple as
A—small radium capsule
B—cartridge container
C—rigid string support

The use of gamma rays in radiographing steel castings has increased by leaps and bounds since 1930, when the first commercial use of radiography was marked by a picture of the sternpost of the cruiser "Chester". Radium radiography is simple, economical and effective; because it may be rented or leased, the equipment doesn't require a capital investment. Because it is simple to operate, it doesn't require especially skilled operators. By 1948 200 steel foundries were renting or leasing radium from the Radium Chemical Co., Inc., and today radium radiography is rapidly approaching the status of standard equipment in progressive steel foundries. Photograph shows a simple method for radiographing a flange on a heavy steel casting. Let us tell you more about the simplicity and economy of radium radiography; write today for prices, terms and case histories.

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PURO-SEAL FLUX

for producing BETTER BRASS *and* ALUMINUM CASTINGS

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FOUNDRY CONSULTING and METALLURGICAL SERVICE
SAVES many times its cost

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CORE SANDS
SILICA SANDS
BLAST SANDS
STEEL ABRASIVES

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Flasks & Jackets
"SAJCO" Self Adjustable Jackets

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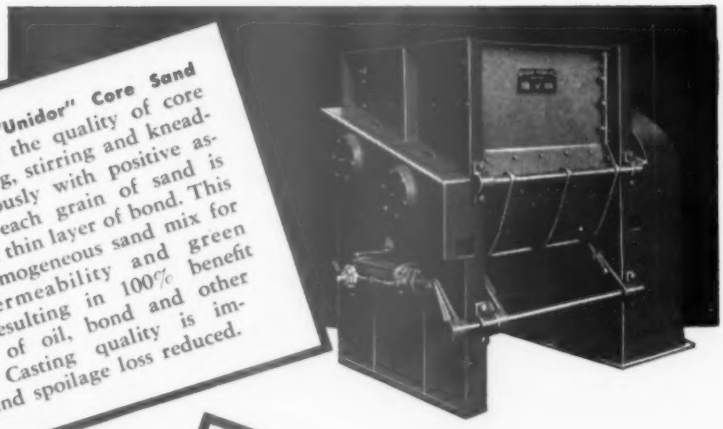
A. F. S. Research Committee's Sand Control Standards Established and Maintained

PEERLESS MINERAL PRODUCTS CO.
Whitney Block — CONNEAUT, OHIO — Phone 51901

Better castings from improved sands...

BAKER PERKINS

"Unidor" core sand mixers and continuous mullers for molding sand



Baker Perkins "Unidor" Core Sand Mixers improve the quality of core sand by rubbing, stirring and kneading simultaneously with positive assurance that each grain of sand is coated with a thin layer of bond. This insures a homogeneous sand mix for desired permeability and green strength resulting in 100% benefit from use of oil, bond and other binders. Casting quality is improved and spoilage loss reduced.

Baker Perkins Continuous Mullers are ideal for mixing and tempering molding sands on a large scale. Unique blade arrangement thoroughly mulls and aerates the tumbling sand mass, and each grain is correctly coated with bond. With a minimum of attention, the B-P Muller will deliver an uninterrupted flow of 30 to 120 tons of molding sand per hour with the proper size unit recommended for the job.

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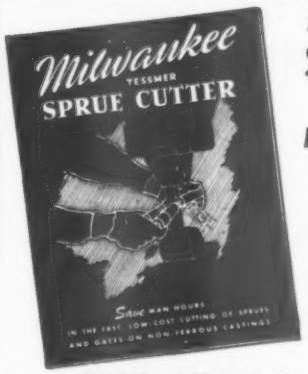

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Non-Ferrous Foundries

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5 TO 15 TIMES GREATER LIFE

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TENSILE STRENGTH: 125,000 LBS. PER SQ. IN.

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YIELD POINT: 90,000 LBS. PER SQ. IN.

1¾" WROUGHT IRON CHAIN

SHORTER LIFE

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TENSILE STRENGTH: 48,000 LBS. PER SQ. IN.

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YIELD POINT: 25,000 LBS. PER SQ. IN.

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A GREAT NAME IN
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that last and last and last!

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An invention in valve means

Streamlined Assembly. Air-O-chek Air Gun and standard pipe fitting ferruled to hose.

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Used in leading foundries and machine shops.

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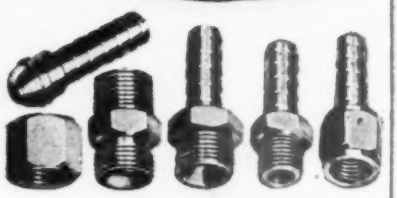

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SQUARE TWISTED STEEL
GAGGERS!

Available for prompt delivery in ⅜, ½, & ⅝ thicknesses • Single or Double Bend • Leg, Toe & Heel to customers specifications. Let us quote—The price is right. Call JE 5858 or Write.

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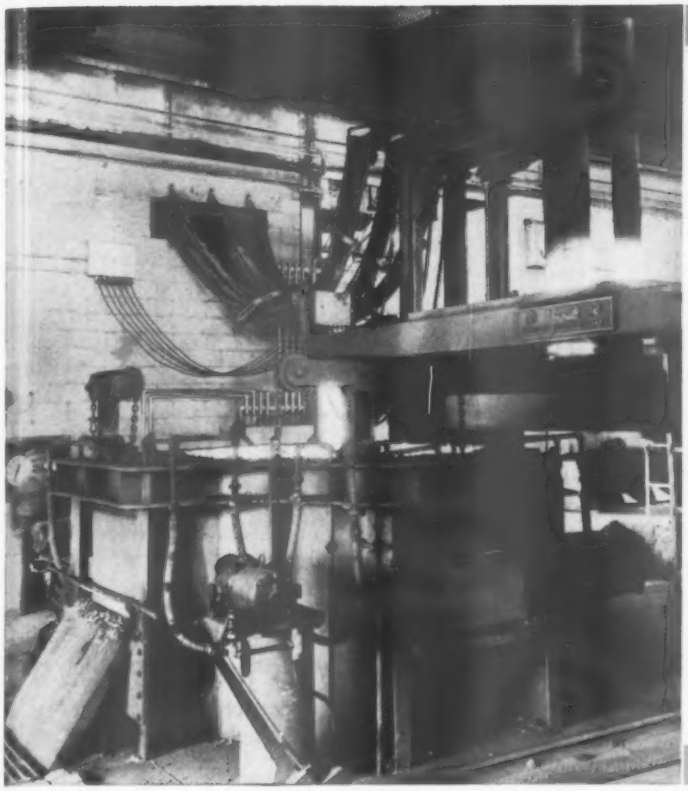

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Precision-built, gear-driven mechanisms for maximum safety and dependability.

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UNITED STATES STEEL

Reduce Use of Chills in Gray Iron Casting

Now all you have to do to get hard chilled iron is add

TELLURIUM

Comes in 1, 2, 3 and 4-gram tablets; also in powder, slabs and sticks. For full information, write Dept. LM for 8-page article, "Use of TELLURIUM In Promoting Chills On Gray Iron Castings."

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Why many Foundries say the Open Head Radiator Chaplet is better—

The Open Head of this chaplet permits sounder packing of sand under head and around the stem. This firmer hold on chaplet insures better core support—reduced casting rejects.

Cleveland Chaplet & Mfg. Co.
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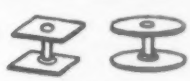

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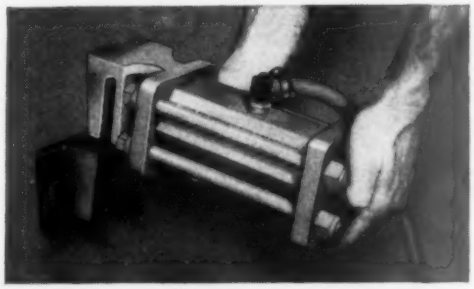

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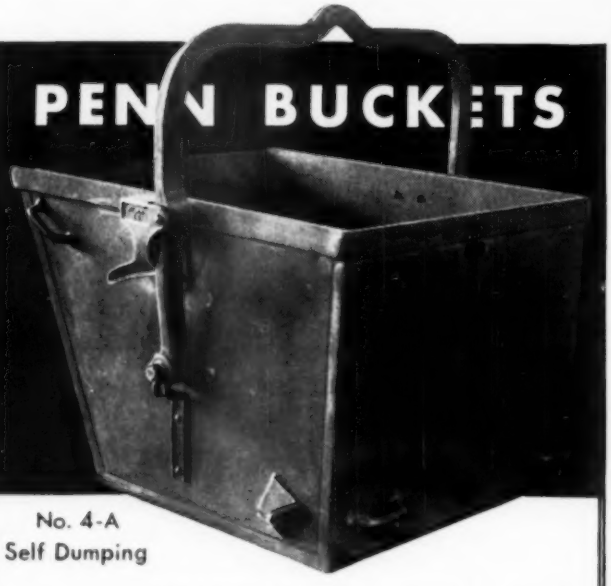

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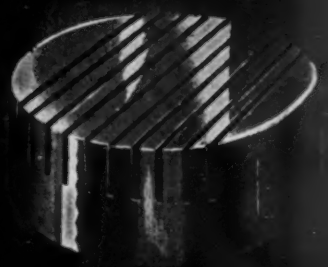

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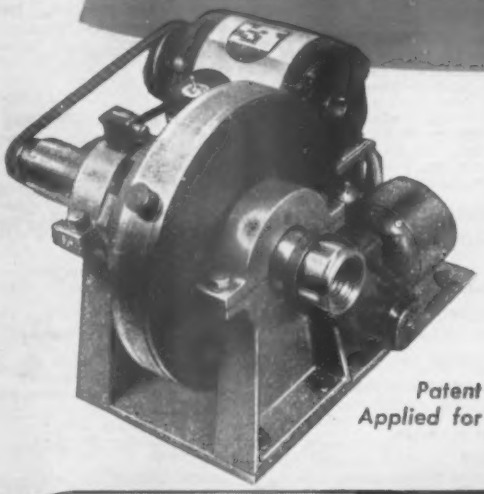

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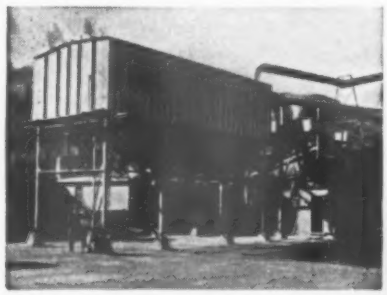

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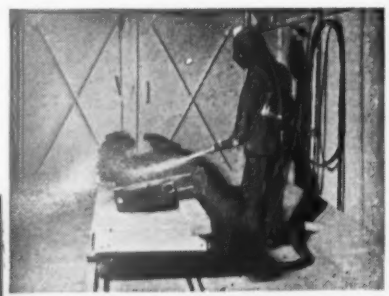

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Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.

BRIQUETTS (Alloy) (Cont'd.)

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro-Alloys Corp., Canton 2, Ohio

BRIQUETS (Ferro Alloy)

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro-Alloys Corp., Canton 2, Ohio

BRIQUETS (Silicon Carbide)

Carborundum Co., Perth Amboy, N. J.

BRIQUETING MACHINERY (Metal)

Milwaukee Foundry Equipment Co., 3328 Pierce St., Milwaukee 4, Wis.

BRUSHES

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

BUCKETS (Elevating, Clam Shell, Drag Line, Grab, Loader, Dumping)

Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.
Erie Steel Construction Co., Erie, Pa.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Penn Iron Works, Reading, Pa.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

BUILDING and ENGINEERING SERVICE

American Bridge Co., Pittsburgh 19, Pa.

BURNERS (Acetylene, Oil, Gas, Powdered Coal, Stoker)

Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.

BUSHINGS (Blow-plate)

Martin Engineering Co., Kewanee, Ill.

BUSHINGS (Flask-Pin)

Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Smillie & Co., C. M., 1124 Woodward Hgts. Blvd., Ferndale 20, Mich.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Universal Engineering Co., Frankenmuth, Mich.

CALCIUM BORIDE

Molybdenum Corporation of America, Pittsburgh 19, Pa.

CALCIUM MOLYBDATE

Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.
Molybdenum Corporation of America, Pittsburgh 19, Pa.

CARBON BOOSTER

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CARS (Core Oven)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

CARS (Mold Drying)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

CASTINGS

City Pattern Foundry & Machine Co., 1165 Harper Ave., Detroit 11, Mich.
Wheland Co., Chattanooga, Tenn.

CASTING MACHINES (Centrifugal)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Centrifugal Casting Mach. Co., Tulsa, Okla.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

CASTING MACHINES (Permanent Mold)

Centrifugal Casting Machine Co., Tulsa, Okla.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

CASTING PLASTER

United States Gypsum Co., 300 W. Adams St., Chicago, Ill.

CASTING SEALER

Empire Varnish Co., 2636 E. 76th St., Cleveland 4, Ohio
Metallizing Company of America, 3520 W. Carroll Ave., Chicago 24, Ill.
Tousey Varnish Co., 520 West 25th St., Chicago 16, Ill.

CASTINGS (Permanent Mold)

Master Pattern Co. 1315 Main Ave., Cleveland, Ohio.

CEMENT (Metallic)

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Smooth-On Manufacturing Co., 570 Communipaw Ave., Jersey City 4, N. J.

CEMENT (Refractory)

Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Perth Amboy, N. J.
A. P. Green Fire Brick Co., Mexico, Missouri.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa
Ironton Fire Brick Co., Ironton, O.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Norton Co., Worcester 6, Mass.

CEREAL BINDERS

Chas. A. Krause Milling Co., 404 East State St., Milwaukee. Wis.

CHAIN (Hoist, Conveyor, Drive, Sling, etc.)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Chain Mfg. Co., Broadway & Henry Sts., Cleveland 5, Ohio.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus, O.
Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Taylor Chain Co., S. G., Hammond, Ind.

CHAIN (Steel Loading)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.

CHAIN (Steel Loading) (Cont'd.)

Cleveland Chain Mfg. Co., Broadway & Henry Sts., Cleveland 5, Ohio.
David Round & Sons, Broadway & Henry Sts., Cleveland 5, Ohio.

CHAIN (Welded and Weldless)

Chisholm-Moore Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Chain Mfg. Co., Broadway & Henry Sts., Cleveland 5, Ohio.

CHAINS (Sling)

Cleveland Chain Mfg. Co., Broadway & Henry Sts., Cleveland 5, Ohio.

CHAPLETS

Angell Nail & Chaplet Co., 4580 E. 71st St., Cleveland, Ohio.
Cleveland Chaplet & Mfg. Co., 1197 W. 67th St., Cleveland 2, O.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.
Fanner Mfg. Co., Brookside Park, Cleveland 2, Ohio.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee 4, Wis.
Smith & Richardson Mfg. Co., Geneva, Ill.
Frederic B. Stevens, Inc., Detroit 16, Mich.

CHARCOAL

Tennessee Products & Chemical Corp., American National Bank Bldg., Nashville 3, Tenn.

CHARCOAL (Briquets)

Ford Motor Co., Iron Mountain, Mich.

CHEMICALS

Hercules Powder Co., Wilmington 99, Del.
Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.

CHEMISTS

Crobaugh Co., Frank L., 1426 West Third St., Cleveland 13, Ohio.

CHILLS

Alloy Metal Abrasive Co., 311 W. Huron St., Ann Arbor, Mich.
Angell Nail & Chaplet Co., 4580 E. 71st St., Cleveland, Ohio.
Fanner Mfg. Co., Brookside Park, Cleveland 2, Ohio.
Milwaukee Chaplet & Mfg. Co., 1023 So. 40th St., Milwaukee 4, Wis.
Standard Horse Nail Corp., New Brighton, Pa.

CHILL COATINGS

Acheson Colloids Corp., Port Huron, Mich.

CHILL NAILS

Angell Nail & Chaplet Co., 4580 E. 71st St., Cleveland, Ohio.
Capewell Mfg. Co., Hartford, Conn.
Standard Horse Nail Corp., New Brighton, Pa.

CHIPPERS—See PNEUMATIC TOOLS

CHISELS (Chipping)

Arrow Tools, Inc., 1900 S. Kostner, Chicago, Ill.
Cleco Division of Reed Roller Bit Co., Houston, Texas.

CHROMIUM (Briquets)

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

CLAMPS (Flask)

Diamond Clamp & Flask Co., Richmond, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Sterling Wheelbarrow Co., 1700 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

CLAMPS (Permanent Mold)

Master Pattern Co., 1815 Main Ave., Cleveland, Ohio.

CLAY (Bonding)

American Colloid Co., 363 W. Superior St., Chicago 10, Ill.
Carpenter Brothers, Inc., 606 West Wisconsin 3, Mo.
Baroid Sales Division, 830 Ducommun St., Los Angeles 12, Calif.
Eastern Clay Products, Inc., Jackson, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.

CLAY (Refractory)

Carpenter Brothers, Inc., 606 West Wisconsin 3, Mo.
Eastern Clay Products Inc., Jackson, O.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.
Chas. Taylor Sons Co., P. O. Box 56, Annex Sta. Cincinnati 14, Ohio.

CLAY STORAGE BINS

Neff & Fry, Camden, O.

CLEANING EQUIPMENT (Castings)

American Wheelabrator & Equipment Co., 506 S. Byrkit St., Mishawaka, Ind.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.
N. Ransohoff, Inc., 16 E. 72nd St., Cincinnati 16, Ohio.

CLUTCHES (Magnetic)

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Stearns Magnetic Mfg. Co., 622 S. 28th St., Milwaukee 4, Wis.

COAL STORAGE BINS

Neff & Fry, Camden, O.

COKE (Foundry)

DeBardeleben Coal Corp., 2201 First Ave., N., Birmingham 3, Ala.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Pickands, Mather & Co., Cleveland 14, O.
Republic Coal & Coke Co., 8 So. Michigan Ave., Chicago 3, Ill.
Semet-Solvay Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
Tennessee Products & Chemical Corp., American National Bank Bldg., Nashville 3, Tenn.

COKE (Petroleum)

Republic Coal and Coke Co., 8 S. Michigan Ave., Chicago 3, Ill.

COLLECTORS (Dust)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland, O.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Corp., 2545 E. 79th St., Cleveland 4, O.
Schmieg Industries, 302 Piquette St., Detroit 2, Mich.
Schneible Co., Claude B., 2827-25th St., Detroit 16, Mich.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

CONCRETE STORAGE BINS

Neff & Fry Co., Camden, O.

CONTROL SYSTEMS (Dust)

American Air Filter Co., 223 Central Ave., Louisville, Ky.
American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Schmieg Industries, 302 Piquette St., Detroit 2, Mich.
Claude B. Schneible Co., 2827 25th St., Detroit 16, Mich.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

CONVERTER BLOWERS

Roots-Connersville Blower Corp., Connersville, Ind.

CONVERTERS (Bessemer)

Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

CONVEYOR DESIGN

Frank D. Campbell, 332 So. Michigan Ave., Chicago, Ill.
Giffels & Valet, Inc., Marquette Bldg., Detroit, Mich.

CONVEYORS (Apron)

Logan Co., 580 Cabel, Louisville, Ky.

CONVEYORS (Belt)

Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Imperial Belting Co., 1800 So. Kilbourn Ave., Chicago 23, Ill.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Chain)

Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Gravity)

Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Live Roller)

Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Magnetic)

Stearns Magnetic Mfg. Co. 662 S. 28th St., Milwaukee 4, Wis.

CONVEYORS (Monorail)

American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 E. 283rd St., Wickliffe, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Penn Iron Works, Reading, Pa.

CONVEYORS (Overhead)

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

CONVEYORS (Pneumatic)

Fuller Company, Catasauqua, Pa.

CONVEYORS (Portable)

Joy Mfg. Co., Joy Division, Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

CONVEYORS (Portable-Gas Electric)

Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

CONVEYORS (Rubber)

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Standard Conveyor Co., North St. Paul 9, Minn.

CONVEYORS (Vibrating)

Ajax Flexible Coupling Co., Westfield, N. Y.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Simplicity Engineering Co., Durand, Mich.
Syntron Company, Homer City, Pa.

COPPER

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

COPPER SHOT

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Niagara Falls Smelting & Refining Div., Continental-United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.

CORE BINDERS

American Cyanamid Co., 30 Rockefeller Plaza, New York, N. Y.
American Gum Products Co., 500 Fifth Ave., New York 18, N. Y.
Bakelite Corp., 300 Madison Ave. New York 17, N. Y.
Cities Service Oil Co., 3200 S Western Ave., Chicago 8, Ill.
Corn Products Sales Co., 17 Battery Pl., New York 4, N. Y.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
General Electric Co., Pittsfield, Mass.
Hercules Powder Co., Wilmington 99, Del.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Chas. A. Krause Milling Co., 404 E. State St., Milwaukee 1, Wis.
Robeson Process Co., 500 Fifth Ave., New York 18, N. Y.
Superior Flake Graphite Co., 33 So. Clark St., Chicago 3, Ill.
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
United Oil Mfg. Co., 1429 Walnut St., Erie, Pa.
Velsicol Corp., 330 E. Grand Ave., Chicago 11, Ill.

CORE BLOWER BUSHINGS

Eastern Clay Products, Inc., Jackson, Ohio.
Martin Engineering Co., Kewanee, Ill.

CORE BLOWING MACHINES

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Wm. Demmler & Bros., Kewanee, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
International Molding Machine Co., LaGrange Park, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

CORE BOXES

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.
Plastic Corp. of Chicago, 2444 So. Central Ave., Cicero 50, Ill.

CORE COLORING

Eaton Chemical & Dyestuff Co. 1490 Franklin, Detroit, Mich.

CORE COMPOUND

Bakelite Corp., 300 Madison Ave., New York 17, N. Y.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Velsicol Corp., 330 E. Grand Ave., Chicago 11, Ill.

CORE DRAWING MACHINES

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Freeman Supply Co., Toledo 5, O.
Newaygo Engineering Co., Newaygo, Mich.

CORE DRIERS (Dielectric)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

CORE GRINDERS (Power Operated)

Jeffrey Mfg. Co., Columbus 16, O.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.

CORE KNOCKOUT MACHINES

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Pangborn Corp., Hagerstown, Md.
Simplicity Engineering Co., Durand, Mich.

CORE MAKING MACHINES

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Wm. Demmler & Bros., Kewanee, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Co., 3228 W. Pierce St., Milwaukee 4, Wis.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Wadsworth Equipment Co., 2457 Mogadore Rd., Akron, Ohio

CORE OILS

Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Delta Oil Products Co., Milwaukee 9, Wis.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Frederic B. Stevens, Inc., Detroit 26, Mich.
United Oil Mfg. Co., 1429 Walnut St., Erie, Pa.
Velsicol Corp., 330 E. Grand Ave., Chicago 11, Ill.

CORE OVENS

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, O.
Despatch Oven Co., Minneapolis 14, Minn.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit, Mich.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, O.
Girdler Corp., Thermex Division, 224 E. Broadway, Louisville 2, Ky.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Ross Engineering Corp., J. O., 350 Madison Ave., New York 17, N.Y.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

CORE PASTE

Corn Products Sales Co., 17 Battery Pl., New York 4, N. Y.
Delta Oil Products Co., Milwaukee 9, Wis.
Eastern Clay Products Co., Jackson, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

CORE PLATES (Steel, Asbestos)

Black, Sivalls & Bryson, Inc., 720 Delaware, Kansas City 6, Mo.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.
Johns-Manville, 22 E. 40th St., New York 16, N. Y.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

CORE ROD STRAIGHTENING and CUTTING MACHINERY

American Wheelabrator & Equipment Co., Mishawaka, Ind.

CORE SAND

Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.
Weldron Silica Co., 38 So. Dearborn St., Chicago, Ill.

CORE SAND MIXERS

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Baker Perkins Inc., Saginaw, Mich.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Blystone Division, Standard Sand & Machine Co., 543 W. Washington St., Chicago 6, Ill.
Clearfield Machine Co., Clearfield, Pa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, Ohio
Freeman Supply Co., 1152 E. Broadway, Toledo 5, O.
Multiplex Machinery Corp., Elmore, Ohio.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Posey Iron Works Inc., Lancaster, Pa.
Royer Foundry & Machine Co., Kingston, Pa.

CORE STRIPPERS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORE SPRAYERS

Freeman Supply Co., 1152 Broadway, Toledo 5, O.

CORE TRAYS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

CORE TRUCKS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

CORE VENTS

Demmler, Wm., & Bros., Kewanee, Ill.
Freeman Supply Co., 1152 E. Broadway, Toledo 5, Ohio.
Smillie, C. M. & Co., 1124 Woodward Heights Blvd., Ferndale 20, Mich.
United Compound Co., Inc., 328 South Park Ave., Buffalo 4, N. Y.

CORE WASH

Asbury Graphite Mills, Asbury, N. J.
Bloomsbury Graphite Co., Bloomsbury, N. J.
Carborundum Co., Perth Amboy, N. J.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Corn Products Sales Co., 17 Battery Pl., New York City 4.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Stevens, Frederic B., Inc., Detroit 26, Mich.
United Oil Mfg. Co., 1429 Walnut St., Erie, Pa.
United States Graphite Co., Saginaw, Mich.

CORE WIRE CUTTERS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORE WIRE STRAIGHTENERS

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORE WIRES

Crescent Brass & Pin Co. 5766 Trumbull Ave., Detroit, Mich.

CORES (Annealing)

Pressed Steel Co., Wilkes-Barre, Pa.

CORES (Ceramic)

American Lava Corp., Chattanooga, Tenn.

COUPLINGS (Air Line)

Cleco Division of Reed Roller Bit Co., Houston, Texas.
C. B. Hunt & Sons Inc., Salem, Ohio.
U. S. Air Compressor Co., 5300 Harvard Ave., Cleveland 5, Ohio.

COUPLINGS (Flexible)

Ajax Flexible Coupling Co., Westfield, N. Y.

CRANE LUBRICATING SYSTEMS

Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.

CRANES (Bucket)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Electric Tramrail)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.

CRANES (Electric Traveling)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Erie Steel Construction Co., Erie, Pa.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Gantry)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Modern Equipment Co., Port Washington, Wis.
Wellman Engineering Co., 7000 Central Ave., Cleveland 4, O.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Hand Traveling)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Modern Equipment Co., Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Jib)

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Monorail)

American MonoRail Co., 13104 Athens Ave., Cleveland 7 O.
Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Modern Equipment Co., Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.

CRANES (Self-Propelled)

Silent Hoist & Crane Co., 835 63rd St., Brooklyn 20, N. Y.

CRANES (Traction or Tractor)

Silent Hoist & Crane Co., 885 63rd St., Brooklyn 20, N. Y.

CRUCIBLES

American Crucible Co., North Haven, Conn.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Lava Crucible Co., Pittsburgh, Pa.
National Crucible Co., Mermaid Lane and Queen Sts., Philadelphia 18, Pa.
Ross-Tacony Crucible Co., Tacony, Philadelphia, Pa.
Vesuvius Crucible Co., Swissvale, Pa.

CRUCIBLE FURNACES

Ajax Electrothermic Corp., Trenton, N. J.
Campbell-Hausfeld Co., Harrison, O.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.

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Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.
Peerless Mineral Products Co. Conneaut, Ohio

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Pyrometer Instrument Co., Bergenfield, N. J.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

TIERING MACHINES (Power)

Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.

TIMERS (Electric)

Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

TIN

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

TONGS

Industrial Equipment Co., Minster, O.

TOOLS (Pneumatic Portable)

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Dayton Pneumatic Tool Co., Dayton 1, O.
Gardner-Denver Co., Quincy, Ill.
Independent Pneumatic Tool Co., Aurora, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Schramm Inc., West Chester, Pa.

TORCHES and BURNERS (Acetylene, gas, oil)

Linde Air Products Co., 30 E. 42nd St., New York 17.

TOTE BOXES (see "BOXES-TOTE")

TRACTOR (Gas Powered)

Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.
Frank G. Hough Co., Libertyville, Ill.

TRADE ASSOCIATIONS

Crucible Manufacturers Association, 90 West St., New York 6, N. Y.

TRAMRAIL SYSTEMS

American MonoRail Co., 13104 Athens Ave., Cleveland 7, Ohio
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Modern Equipment Co., Port Washington, Wis.

TRAPS

Jas. A. Murphy & Co., Hamilton, Ohio.

TROLLEYS

Curtis Pneumatic Machinery Co., 1922 Kienlen Ave., St. Louis 20, Mo.
Modern Equipment Co., Port Washington, Wis.

TRUCK CRANES

Silent Hoist & Crane Co., 885 63rd St., Brooklyn 20, N. Y.

TRUCK WHEELS

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

TRUCKS (Casting)

Kwix-Mix Co., Port Washington, Wis.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

TRUCKS (Core Oven)

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

TRUCKS (Power Lift)

Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.
Frank G. Hough Co., Libertyville, Ill.

TUBES (Annealing)

Pressed Steel Co., Wilkes-Barre, Pa.

TUBES (X-Ray)

General Electric X-Ray Corp., 4855 Electric Ave., Milwaukee 14, Wis.

TUMBLING BARRELS

N. Ransohoff, Inc., 16 E. 72nd St., Cincinnati 16, Ohio.
Royersford Foundry & Machine Co., Royersford, Pa.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

TURNTABLES

Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Modern Equipment Co., Port Washington, Wis.
Newaygo Engineering Co., Newaygo, Mich.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

UNIT HEATERS

Dravo Corp., Neville Island, Pittsburgh 25, Pa.

VALVES (Air, Water, Steam)

Air-Way Pump & Equipment Co., 1050 N. Kilbourn, Chicago, Ill.

VALVES (Blow-off and Cut-off)

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
C. B. Hunt & Sons, Inc., Salem, Ohio.
Wm. H. Nichols Co., Richmond Mill, Long Island 18, N. Y.

VALVES (Cupola Pressure)

Norwalk Valve Co., S. Norwalk, Conn.

VALVES (Oxygen, Acetylene)

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

VENTILATORS (Roof)

Swartwout Co., 18511 Euclid Ave., Cleveland 15, Ohio.

VENTILATING SYSTEMS

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Joy Mfg. Co., La-Del Division, New Philadelphia, Ohio.
Pangborn Corp., Hagerstown, Md.
Ross Engineering Corp., J. O., 350 Madison Ave., New York 17, N.Y.
Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.

VENTILATING SYSTEMS (Cont'd.)

W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Westinghouse Electric Corp., B. F. Sturtevant Div., 40 Wall St., New York 4, N. Y.

VENTS (Core Box)

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Demmler & Bros., Wm., Kewanee, Ill.
C. M. Smillie & Co., 1124 Woodward Hgts. Blvd., Ferndale 20, Mich.

VIBRATORS

Adams Co., Dubuque, Iowa.
Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.
Cleveland Vibrator Co., 2828 Clinton Ave. W., Cleveland 13, Ohio.
Davenport Machine & Foundry Co., Davenport, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Martin Engineering Co., Kewanee, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.
New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.
Nichols Co., Wm. H., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.
S P O Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich
Syntron Company, Homer City, Pa.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

VIBRATORS (Core Bench)

Cleveland Vibrator Co., 2828 Clinton Ave. W., Cleveland 13, Ohio.
Martin Engineering Co., Kewanee, Ill.

VISES (Air Operated)

Van Products Co., Erie, Pa.

WAX (Core, Vent, Pattern)

United Compound Co., Inc., 328 South Park Ave., Buffalo 4, N. Y.

WEDGES (Foundry)

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WELDING GAS

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

WELDING APPARATUS (Electric Arc)

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.
Metallizing Company of America, 3520 W. Carroll Ave., Chicago 24, Ill.

WELDING and CUTTING APPARATUS and SUPPLIES

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

WELDING ELECTRODES (Carbon)

National Carbon Co., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.

WELDING RODS & ELECTRODES

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.
Metallizing Company of America, 3520 W. Carroll Ave., Chicago 24, Ill.

WHEELBARROWS

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WHEELS, ABRASIVE (Cut-off)

Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Perth Amboy, N. J.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Norton Company, Worcester 6, Mass.
Raybestos-Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J.
Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.

WHEELS (Wire)

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.

WIRE BENDERS

Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.

WIRE BRUSHES

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.

WIRE CUTTERS

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.

WIRE NAILS

Republic Steel Corp., 3100 E. 45th St., Cleveland 4, Ohio.

WOODWORKING MACHINERY

Do All Company, Des Plaines, Ill.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Oliver Machinery Co., Grand Rapids 2, Mich.

X-RAY EQUIPMENT

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
General Electric X-Ray Corp., 4855 Electric Ave., Milwaukee 14, Wis.

X-RAY FILMS

Eastman Kodak Co., Rochester, N. Y.
General Electric X-Ray Corp., 4855 Electric Ave., Milwaukee 14, Wis.

ZINC

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

Classified Advertising

Wanted-To-Buy

WANTED

Used 3, 3½ or 4 Whiting cupola, or equal with skip hoist. Address: Box 835, The FOUNDRY, Cleveland 13, Ohio.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, The FOUNDRY, Cleveland 13, Ohio.

WANTED

45 ton top pour crane ladle for cast iron with motorized tilting equipment. Address: MACHINE TOOLS SALES COMPANY, 1601 CHESTNUT STREET, PHILADELPHIA 3, PA.

WANTED

Six No. 712-PJ or 710-PJ Osborn molding machines and 4′ x 8′ shakeout in good condition. Address: STILLMAN FOUNDRY CO., 1927 WILL AVE., N.W., GRAND RAPIDS 4, MICH.

WANTED

One mechanical shakeout table, approximate 6′ x 8′. Address: GLAMORGAN PIPE & FOUNDRY CO., LYNCHBURG, VA.

WANTED

Shot blast equipment to clean long, thin section castings. Prefer to buy on an erected and in operating condition basis. Give description and price in first letter. Address: Box 881, The FOUNDRY, Cleveland 13, Ohio.

Foundries For Sale

FOR SALE

Foundry and machine shop located in Elmira, New York. Can furnish work to keep foundry in full operation. All pattern equipment available. Foundry ready to produce at once. Sale price $18,000.

BOX 883

THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE—GRAY IRON FOUNDRY

Jobbing and production. 12,000 sq. ft. floor space. Well equipped molding, core, cleaning and pattern room. Central heating system. Now producing quality castings for the trade. Excellent clientele and reputation for good castings. Located centrally from Detroit, Lansing, Toledo. Real opportunity for capable and aggressive party. Require in excess of $50,000 to handle. Address: Box 870, The FOUNDRY, Cleveland 13, Ohio.

SMALL IRON JOBBING FOUNDRY

Well equipped. 4500 square feet. 31 inch cupola. Operating now—3 moulders. Rent $75 lease available. Detroit suburb. Priced for value of equipment. Address: 5816 Coplin, Detroit 13, Mich.

FOR LEASE

Small iron foundry, Eastern New York. Completely equipped for production and jobbing work. Capacity 8-10 tons per day. Work on hand. Liberal terms based on output. Address: Box 896, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE OR LEASE

Small complete gray iron foundry. Room for expansion. Main foundry building 42′ x 84′. Three buildings for pattern space 20′ x 40′. Large bins for sand, coke and pig iron. Tracks from bins to charging rooms. Address: Box 866, The FOUNDRY, Cleveland 13, Ohio.

Foundries For Sale

FOR LEASE
GRAY IRON FOUNDRY

Eastern central Indiana, fully equipped, large working inventory, attractive lease proposition available immediately. Large profit possibility. Address: Box 736, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE OR LEASE
WITH PURCHASE OPTION

Iron foundry, located in Bridgman, 10 miles south of St. Joseph, Mich. Here is an opportunity to acquire an exceptionally fine plant suitable for heavy grey iron castings, or production lines. Main building has two crane-covered floors 240 ft. long; steel, brick and concrete construction. Total floor area 50,000 sq. ft. Land—7½ acres inside steel fence. C.&O. R.R. sidings. Stoker-fired boiler serves unit heaters; exhaust fans in roof. This very unusual set-up would justify moving your foundry operations from congested city to small town affording good labor supply where living conditions are excellent. For information, address:

Mr. M. R. GAULT

HANNIFIN CORPORATION

1101 S. KILBOURN AVE. CHICAGO 24, ILL.

For Sale

FOR SALE
FOUNDRY EQUIPMENT

A large Massachusetts manufacturing concern has discontinued its gray iron foundry operations to expand manufacturing facilities, therefore all of its foundry materials, equipment and machines are for sale. This material and equipment are in good operating condition and of the type generally used in floor, bench and machine molding, such as:

CARL-MAYER BATTERY OF FOUR (4) CORE OVENS EACH AUTOMATICALLY OIL FIRED.
AMERICAN SAND CUTTER, NO. 766 MODEL D SIZE 96/78.
AMERICAN SAND CUTTER, NO. 238 MODEL M SIZE 99/80.
LANCASTER COUNTER CURRENT RAPID BATCH MIXER — BUCKET LOADER — 15 HP. 550 VOLT 60 CYCLE 3 PHASE MOTOR.
GENERAL ELECTRIC CENTRIFUGAL CUPOLA BLOWER WITH 58 H.P. MOTOR, 550 V., 60 CYCLE, 3 PHASE, CAPACITY 7100 CFM AT 1.25 LB. PRESSURE, COMPLETE WITH CONTROLS.
TABOR MOLDING MACHINES OF VARIOUS TYPES, CHARGING CARS, STEEL FLASKS OF VARIOUS SIZES, ETC.

For full details of items you may be interested in or should you want to make a personal inspection at our plant—Write

BOX 767

THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

149—Truscon Steel Flask—Pin on each end —12 x 16, 4 Cope & 4 Drag.
49—Truscon Steel Flasks—Pin on each end —12 x 18, 5 Cope & 5 Drag.
190—Truscon Steel Flasks—1 Pin on each end —12 x 18, 3 Cope and 3 Drag.
145—Sterling Steel Flasks—1 Pin on each side —12 x 18, 3 Cope & 3 Drag.
119—Truscon Steel Flasks—1 Pin on each side —12 x 18, 3 Cope & 3 Drag.

These Steel Flasks are practically new.

2—Tabor, Air Jolt, Rollover Machines 14 x 16 Table.
1—Pouring Device.
1—Globe Tilting Water Tumbler.
1—American Sand Cutter, Gasoline Driven.
1—Johnson & Jennings 24 x 30 Rollover.
1—Tabor 30 x 40 Rollover Machine.
1—27 x 36 Wheelabrator.
1—#9 Whiting Cupola complete with Motor, Blower, and Blast Regulator.
10—"G" Power Rollover Machines.
15—Jolt Squeezers of most any make.
1—Automatic lift truck with charger.

Osborn 558 and 559 Jolt Strippers.
J.D.P. International Jolt Strippers.

HAYNES FOUNDRY EQUIPMENT CO.
814 ADA ST. KALAMAZOO 52, MICH.

For Sale

FOR SALE

4 Used Tabor Jolt Squeeze Machines
1 Used Ingersoll Rand 8 x 8 class NE Compressor with tank & 15 HP motor
1 Used Beardsley & Piper Model "S" and Model "M" Screenorator
1 Used Beardsley & Piper #3½ Mulbaro
2 Used S.P.O. #2114 Jolt Squeeze Pin Push Molding Machine
2 Used S.P.O. #9032 Jolt hand clamp Rollover Draw Molding Machine
1 Used Despatch "S" type Gas Fired 8′ 0″ wide, 7′ 0″ high, 6′ 0″ deep, rack type Core Oven with 3 racks and Lift Track
2 Used Buzzer #200 Aluminum Melting Furnaces
1 Used Fen Machine #80 Melting Furnace
1 Used Johnston & Jennings #681-C Portable Jolt Stripper

FOUNDRY SUPPLY COMPANY INC.
404 SOUTH THIRD ST.
MINNEAPOLIS 15, MINN.

FOR SALE

WE HAVE CLOSED OUR GRAY IRON FOUNDRY AND HAVE THE FOLLOWING EQUIPMENT FOR SALE:

1 Connersville Heavy Duty Horizontal Blower Complete with Pulleys, Safety, Switches and Controls.
1 Fairbanks Morse, 30 h.p. Induction Motor, 60 Cycle, 220 Volt, 3 Phase.
1 Modern Equipment Company #4 Foundry Cupola.
1 Hauck Manufacturing Company Gas Fired Ladle.
3 Modern Equipment Company, 600 lb. Ladles Complete.
1 Beardsley & Piper Company Model S Screenarator.
1 American Air Filter, 36″ x 36″ x 24″ High Steel Dust Collector Complete.
1 Modern Equipment Cupola Charging Unit with 30″ Capacity Steel Bucket Guides, Cable, Motors, Controls, Complete.

PICK MANUFACTURING COMPANY
WEST BEND WISCONSIN

FOR SALE

3—Compartment Armstrong Jet Blast Machine, including three exhaust air scrubbers with water spray nozzles and contacts, two 12 station air manifolds and controls, three air agitators and controls, sixteen blast gun ejectors.
1—Pangborn twin shot blast room. Two compartments each 10′0″ x 10′6″ x 7′6″ with vestibules, abrasive handling and reclamation system, blast equipment, and monorail "I" beam work conveyor with hooks.
1—Coleman core oven—portable shelf type paste drying oven suitable for drying cores complete with controls and indicator.
2—Swing frame grinders, No. 210 deluxe portable Safety Grinding Wheel and Machine Company make, complete with motors and starters.
1—Swing frame grinder., No. 18 H, complete. All have enclosed grinding booths.
1—Ransohoff Wet Mill with power loader, sand removal conveyor and tank, complete in every respect.
2—Osborn Special purpose Core machines, hydraulic draw, hand ram and roll over, built for long narrow cores.
1—Core wire straightener, Kane and Roach No. DX5 roll type for three sizes of wire ⅛″ to ⅜″ complete with motor and starter.

All above equipment has had very little wear.

BOX 890

THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

One Ingersoll Rand Type FS-563 blower direct connected and roller pedestal bearing construction serial #8563-J-10, 11,000 CFM, 1.5 lbs. pressure, 3500 RPM complete with 100 HP Fairbanks Morse motor type QZC, frame RK 505 serial #567765, 3450 RPM. This equipment used only a short time and like new. Price $6,500.00.

NEW HAVEN FOUNDRY
NEW HAVEN, MICHIGAN

FOR SALE

One practically new 6″ Pangborn table blast used only two months.
One American Wheelabrator hand sand blast cabinet.

NARRAGANSETT GRAY IRON FOUNDRY, INC.
130 WEST RIVER ST. PROVIDENCE, R. I.

Classified Advertising

For Sale

EQUIPMENT FOR SALE

MOLDING MACHINES
1—74J-W Osborn Jolt Squeeze Portable.
2—75J-W Osborn Jolt Squeeze Portable.
3—75J Osborn Jolt Squeeze Portable.
3—Federal RAPID Jolt Squeeze Portable.
2—SPO #611B Stationary, Oscillating, Jolt Squeeze Strippers.
1—SPO #4½ JHS Air Jolt Hand Strip.
BLOWERS FOR CUPOLAS AND FURNACES
1—Piqua rotary pressure blower, rated 19 cu. ft. per revolution.
Maxon-Premix Blowers for Gas, ¼ to 1 H.P.
METAL MELTING EQUIPMENT
1—Hausfeld 2000# aluminum capacity furnaces, barrel type, open flame, oil fired.
2—Monarch-Rockwell Rotating, 500# brass, oil. New 32" to 41" Dia. shell Cupolas made to order.
TUMBLING MILLS AND SAND BLAST
1—36" dia. x 54" long reliable tumbling mills.
1—Pangborn No. 2 GH direct pressure type sandblast barrel, motor driven. Complete unit.
1—Pangborn LE 4 ft. sandblast table, continuous sand feed, motor driven. Complete unit.
1—Pangborn Sand Blast Unit including generating tank, shot cleaner, bucket elevator. Suitable for use with room.
1—Pangborn type EN-2 sand blast cabinet, suction type, 5 x 3 x 7 high.
MISCELLANEOUS
Ingersoll-Rand Air Hoist 1-2-3 & 5 ton capacities.
5—Koch electrically heated ovens for baking cores, 4½ ft. wide, 6 ft. high, 6 ft. deep, complete with recirculating fan and controls.
1—Young Bros. tower core oven, 5 ft. x 1 ft. shelves, gas fired, complete with Foxboro control.
1—Young Bros. batch type recirculating hot air, gas fired, core oven, 5 ft. x 6 ft. door opening, 9 ft. deep.
3—Foundry Equipment Co. sliding shelf core ovens, with five 30 x 42" shelves, 8" high, gas fired.
1—Lampson Endless Mold Conveyor, 100 ft. long x 16 ft. wide, with 19 x 26" pallets, 36" on centers.
6—24" wide belt conveyors for sand, totalling approximately 500 ft. Individual units can be furnished any desired length.
17—Sand hoppers with foundry type bin gate.
1—Bucket sand elevator, 50 ft. tall, complete.
4—Heavy duty flexible shaft grinders 2 HP.

CLIFTON MACHINERY CO.
1023 W. 6th ST. CINCINNATI 3, OHIO
PHONE PARKWAY 7812

FOR SALE

1—Whiting Cupola #6, with 50 foot stack. Dismantled and in excellent condition.
1—Root Blower #7 with 75 HP Motor.
1—Lindberg Pit Type Tempering Furnace—Type 2828-EH, Serial #A50689.
2—Tannewitz Bandsaws with 36" wheels and one with 42" wheel excellent condition.
5—Double End Pedestal Grinders.
1—Royer Shakeout Machine.
12—Tabor Stationary Jar Top Squeezers.
1—American Wheelabrator Multi-Tablast, Model BM-66200, Serial #A50689.
1—Tabor Portable Jar Flask Lift Moulding Machine 20" x 24" Table.
1—Tabor Portable Shockless Jar Flask Lift Moulding Machine 32" x 32" table.

OLD COLONY FOUNDRY CO.
EAST BRIDGEWATER
MASSACHUSETTS

FOR SALE

GRAY IRON FOUNDRY. Well established business with good profit record. Priced reasonable.

SMALL IRON FOUNDRY. Well equipped. Good customers. Will sell on terms.

EDWARD H. ZOLL

INDUSTRIAL PROPERTIES THROUGHOUT THE EAST

790 BROAD ST., NEWARK, N. J.

For Sale

FOR SALE

FOUNDRY EQUIPMENT
1—27" x 36" Tumblast.
1—#2 Multi-Table TABLAST — PRICED TO SELL.
1—Pangborn ROTO-BLAST, Horizontal Spindles —NEW, NEVER INSTALLED.
1—Pangborn Hand Sandblast Cabinet, complete with Dust Collector—Excellent Condition.
1—BVR-7 Pangborn Abrasive Separator.
1—15 H.P. U. S. Swing Frame Grinder complete, 24" x 3" Wheel—Used Very Little.
Location: Our Cincinnati Warehouse
PHONE: Mr. Don Whitehead
PRINCETON 8405 (Glendale, Ohio)

L. J. LAND, INC.
146 GRAND STREET
NEW YORK 13, N. Y.
CANAL 6-6976

FOR SALE

1—Rebuilt American Sand Cutter, Model AA, 72" overall width with 61" wide cutting cylinder.
1—New International Type SB13 Core Blower with SB762 sand container, equipped complete with rollers in the table, core box locking valve and vibratorially agitated sand hopper.
2—New International Type JL Jolt Ram Air Cylinder Post Lift Molding Machines, size 10# cylinder, 30" x 42" table.
1—New International Jolt Roll Over Molding Machine 20 x 8", Type HDG, Serial 58041-2.
These machines can be inspected at our plant.

THE EASTERN FOUNDRY COMPANY
BOYERTOWN, PA.

REBUILT EQUIPMENT

20—Osborne Jolt Squeezers, Type 275J
4—International R.O. 20 x 8, Type G
2—International R.O. 24 x 10, Type G
1—Herman R.O., 1500 Series

1—Simpson #2 Mixer, Motor Drive, with Loader and Dust Hood—late model
1—27" x 36" American Wheelabrator
1—Model "8" B. & P. Screenarator
2—Royer Sand Aerators

RAY P. SCULLY
SCULLY MACHINERY & EQUIPMENT CO., NOT INC.
767 MILWAUKEE AVE., CHICAGO 22, ILL.
PHONE: CANAL 6-0314

FOR SALE

McLain's System course Steel Foundry Practice, pamphlet form without correspondence feature for $25, never sold for less than $75. Closing out edition.

McLAIN'S SYSTEM INC.
236 E. NORTH AVE. MILWAUKEE 12, WIS.

FOR SALE
CUPOLA BLOWER

1—Ingersoll-Rand Direct Connected Electric Motor Driven Centrifugal Blower 8700 C.F.M. 1.25# per square inch pressure, 3500 R.P.M. complete with 75 H.P. 3 Phase 60 Cycle 220 Volt 40 Deg. C Rise Ball Bearing, Squirrel Cage, Induction Type, Standard Open Motor, Manual Reduced Voltage Starter, Blast Gate Mechanism for Constant Air Weight Control assembled to 1-R Blast Gate and including two (2) Current Transformers and one (1) Air Weight Ammeter Calibrated in lbs. of Air per minute and also amperes. First Class Condition.

CORE BLOWER

1—Randall Core Blower complete with Clamping device. Practically New.

MOLDING MACHINE

1—#401-C (Johnston & Jennings) Portable Jolt Squeeze Molding Machine. Practically New.

SAND CUTTING MACHINE

1—Size #84 model AA American Sand Cutting Machine with Cable Reel and 100' 3-conductor rubber cable and plug; Motor driven by 10 H.P. G.E. Induction Motor—model #69A1—Type KT948-4—Form C—220 volts, 24.2 amps., 1800 r.p.m., 3 phase, 60 cycles; G. E. oil circuit breaker, 50 amps., 600 volts. Good Condition.

THE G. & C. FOUNDRY COMPANY
SANDUSKY, OHIO

For Sale

EQUIPMENT FOR SALE
PANGBORN SHOT BLAST ROOM

New—never installed. Size 12' x 25' with two blast chambers, complete with new Pangborn Dust Collector, 60 cycle A. C. motors.

BEARDSLEY & PIPER SANDSLINGER

Motive Jr. track traveling type; had very limited use—excellent conditions.
BEARDSLEY & PIPER SAND CONDITIONER
In fine condition—used about one year. Magnetic pulley.

No. 1 SIMPSON SAND MULLERS

2—machines available—one is practically new. Other equipment: Complete Laboratory; American Sand Cutter; American Dustube Collector; Mold Wash Mixer. For information, address:

MR. M. R. GAULT
HANNIFIN CORPORATION
1101 S. KILBOURN AVE., CHICAGO 24, ILL.
TELEPHONE NEVADA 8-0406

FOR SALE

DUST COLLECTOR. American Air Filter type W roto clone, arrangement D, Wet system. Capacity 6000 CFM. Equipped with stainless steel impeller blades. Only slightly used. Excellent condition. Price quoted, without motor or electrical controls on request. Address: UNIVERSAL FRICTION MATERIALS COMPANY, 303 WEST RUSH STREET, KENDALLVILLE, INDIANA.

FOR SALE

Two Herman rollover molding machines in excellent condition. Size 40 x 58" 3740 pounds rollover capacity suitable for foundry equipped with sandslinger. Offered at bargain price. Address: Box 861, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Two #5 Connersville cupola blowers, 16.9 cu. ft. per displacement, 4900 ft. per minute. Address: Box 894, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

NEW

1 16" Endless Belt—Royer Sand Mixer
5 1 pt. Brass Mouth Sprayers, Fig. 107A
2 Plow Beam Bushings 3 11/16" x 2 15/16" x 6" C-4-9 for #3 Simpson mixer.
2 Ladles 17½" dia. x 16" high
1 Ladle 16" dia. x 16" high
2 Ladles 11" dia. x 11" high
1 Set Cupola Bottom Doors for #5 Whiting Cupola

USED

1 Royer C-2 Portable Sand Blender, capacity 500# Sand per min., includes 2 h.p. Century motor, 440 volt, 3 phase, 60 cycle and starting switch
1 Royer D Portable Sand Blender, capacity 800# Sand per min., includes 3 h.p. Century motor, 440 volt, 3 phase, 60 cycle and starting switch
1 500# Modern Insulated Ladle less tilting gear
3 20" Combs gyratory Riddles type V, 110 volt, 60 cycle
1 Hanna Air Cylinder 8" dia., 4'0" stroke, w/control valve
1 Engeberg Steam Engine, 9" bore, 10" stroke, 300 rpm, Ser. 5671, Frame J, with Westinghouse AC generator, 62.5 K.V.A., 480 volts, 75 Amp, 3 phase, 60 cycle, 300 rpm, Ser. 2S33F364, and Westinghouse Exciter, SK-DC, frame 133, 6.25 K.V.A., 125 volts, 50 amp, 300 rpm, Style 29E-860, Ser. 4792334, and three field rheostats
1 Fairbanks-Morse 2 cyl. Diesel Engine 75 h.p., 300 rpm, with same type generator and exciter as listed above, starter tanks, air compressor, and 1½ h.p. Fairbanks-Morse gasoline starting engine.

SEALED POWER CORPORATION
MUSKEGON 61, MICHIGAN

FOR SALE

Hines aluminum pop-off flasks, numerous sizes including jackets. Will furnish size upon request. Majority unused. Anyone interested contact: PURCHASING DEPARTMENT, RICHMOND RADIATOR COMPANY, UNIONTOWN, PENNSYLVANIA.

Classified Advertising

For Sale

FOR SALE

USED FOUNDRY EQUIPMENT

OSBORN JOLT SQUEEZE MOLDING MACHINES—12 machines Model 275-J; OSBORN JOLT SQUEEZE ROLLOVER Model 331; OSBORN CORE ROCKOVER—Model 140-J; SPO JOLT SQUEEZE MOLDING MACHINE Model 1104; same, Model 2754; OSBORN JOLT SQUEEZE STRIP MOLDING MACHINE Model 7012-J; Two OSBORN JOLT SQUEEZE MOLDING MACHINES Model 275 JW; SPO JOLT STRIP SQUEEZE MOLDING MACHINE, Model 213 U.P. same Model 211-B; Four—18 x 52 RD. W. W. SLY MILLS complete with legs, bearings, covers; Two—36" x 72" Sq. W. W. SLY MILLS complete with legs, bearings, covers, kenney clutches. Two—30" x 46" W. W. SLY MILLS shell and heads only; One—FIREBRICK CRUSHER with 5 H.P. 1200 RPM 3 phase 220 volt 60 cycle Fairbanks Morse Motor; CORE BOOKING MACHINES; BRIGGS and STRATTON GASOLINE HOIST TRUCK; GE Transformer 60 cycle single phase 115 volts; One—1-TON DAVID ROUND WINCH; STEPHENS AND ADAMSON SPEED REDUCER WINCH; ARCADE WOOD SNAP FLASKS mostly one of a kind 10 x 17 up to 18 x 18 cope 4, 4½, or 5 and drag 3, 3½ or 5; ALUMINUM SLIP FLASKS one of a kind 8 x 16 to 15 x 27 cope 4, 5, 6 and drag 2½, 3, 3½ or 4.

THE FOREST CITY FOUNDRIES CO.

2500 WEST 27th STREET

CLEVELAND 13, OHIO

FOR SALE

4—Tabor Overhead Squeeze Machines
1—Davenport Jolt Machine, Type A.J.S. #229
1—Heavy Duty Direct Connected Electric Grinder, equipped with exhaust connections, safety type starter with push button control, 34½" between wheels, 1¼ x 2 x 20 wheel size.

BARNES MANUFACTURING CO.

MANSFIELD, OHIO

For Sale

FOR SALE

TURBO BLOWERS (3 Phase, 60 Cycle)

cfm	Pressure	Make	Motor H.P.	Volts	Speed
3500	40 oz.	Spencer	60	440	1800
2200	40 oz.	Spencer	40	220/440	3600
1400	16 oz.	Spencer	220/440	3/60	3600
1050	32 oz.	Spencer	15	550	3500
900	24	Spencer	15	220/440	1800
225	10	Spencer	1	220/440	3600
PRESSURE BLOWERS (3 Phase, 60 Cycle)					
2500	7 oz.	Sturtevant	15	220/440	1800
2400	14 oz.	Mahr	15	220/440	3480
1300	16 oz.	Nth.Amer.	10	440	1800
1150	20 oz.	Nth.Amer.	10	220/440	3600
950	16 oz.	Nth.Amer.	7½	220/440	3600
660	20 oz.	A & B	7½	440	3600
550	20 oz.	A & B	5	440	3600
450	6 lbs.	A & B	30	220/440	3450
340	20 oz.	A & B	3	440	3600
250	12 oz.	Gen. Elec.	2	220/440	3600
150	12 oz.	Nth.Amer.	1	220	3600

MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVENUE
CLEVELAND, OHIO

FOR SALE
NATIONAL ENGINEERING SAND CONDITIONING MOLD CONVEYOR & SHAKEOUT

One compact, complete unit with 50-ton sand storage hopper; #3 Simpson Mixer with cooling hoods; double sand measuring hoppers, 30 cubic foot capacity each; air operated; 3 syntron bond hoppers; sand elevators; 10-ton prepared sand hopper with table feeder; mold conveyor has 44 trays, 2 feet wide and 5 feet long on an oval shaped track and are hydraulic-pusher type. Robbins Shakeout JF9 is 4 feet x 10 feet, attached. Schneible Wet Dust Collector 23,000 C.F.M. to ventilate shakeout mold cooling and sand system hoods. Unit takes approximately 2,200 square feet floor space and is complete with all motors, controls, pumps and sand belts, ready to install and operate in your foundry. Used less than one year.

WESTINGHOUSE ELECTRIC CORPORATION
1216 W. 58th STREET CLEVELAND, OHIO

FOR SALE

Multiple-pass vertical core oven, 24' x 16½' x 11½', gas fired, cross bar conveyor, cooling zone, Leeds & Northrup controls, rack size 31" x 14" x 25". Excellent condition. Cost $30,000—our price $4,500.

Fresh air supply system, 40,000 CFM, with 154 sq. ft. oil filter system, gas fired, 15 HP blower. All electrical controls. Cost $16,000—our price $3000.

Gardner-Denver vertical air compressor with aftercooler and 40 HP 220/440 volt motor and starter. Our price $750.

H. H. DAVIS CO., INC.
1750 N. KIMBALL AVE., CHICAGO 47, ILL.

FOR SALE

1 only #406 Osborn stationary jolt rollover pattern draw molding machine—flask capacity, max. length overall 78"; width outside 50"; flask space, minimum 13", maximum 24"; jolt cylinder diameter 16"; pattern draw 18"; jolt capacity at 80 lbs.; air pressure 500 lbs.; misc. spare parts; and auxiliary equip. for feeding sand to this unit. For further information, write or call ELECTRIC STEEL FOUNDRY CO., PORTLAND, OREGON.

FOR SALE

A reasonable offer will get you a modern sand handling system consisting of 19 individual moulders' hoppers, two 25-ton sand storage bins, one #50 Beardsley & Piper speed muller with 40 HP Motor, magnetic separator with bucket elevator, overhead monorail system and cab controlled electric hoist and monotractor and shell buckets with automatic trips for delivering sand from speed muller to moulders' hoppers.

OLD COLONY FOUNDRY COMPANY
EAST BRIDGEWATER MASSACHUSETTS

FOR SALE

1½ ton per hour Pittsburgh melting furnace complete with electrical equipment and transformers. Address: Box 884, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

31 x 16 International draw type F jolt ram power turnover molding machine in good condition. Price $850.00. Address: MERCHANTS STATE BANK, NORTH BRANCH, MINN.

For Sale

FOR SALE

One—Coleman, double-core oven, recirculating, rack type, complete with temperature and safety controls, 250,000 BTU, direct gas fired. Rack size 36" wide, 72" long, 60" high. Excellent condition. $1500.

One—American, sand cutter, Model 69/45 with 5-HP motor, 440 v., 75-ft. cable. Used only short while. Excellent condition. $1750.

Have closed foundry, other items for sales at sacrifice prices.

J. H. DUNLOP

PHONE 9-1451

CHATTANOOGA IMPLEMENT & MFG. CO.

CHATTANOOGA, TENNESSEE

FOR SALE

American Wheelabrator tumblast, size 20 x 27 complete with dust collector. May be seen in operation.

THE CENTRAL BRASS MFG. CO.
2950 EAST 55th ST. CLEVELAND 4, OHIO

FOR SALE

COMPLETE ALUMINUM FOUNDRY
3 CAMPBELL-HAUSFELD 2000# Tilting Crucible Furnaces (1 with power tilt)
10 new melting pots
15 ton brand new Firebrick
Air blowers, manifolds, fuel meters, hand ladles, crane, chain hoist, piping, overhead trolleys, etc.
MUST BE SOLD.

MR. ZOLLER
AIRCRAFT COMPONENTS, INC.
BENTON HARBOR, MICHIGAN

FOR SALE

Late Model 36 x 42 American Wheelabrator With extra parts—Tumblast type—a bargain!
#3 Demmler Core Blower—Late Model
1 ton Ingersoll Rand Air Hoists—Ea. $150.00
Simplicity Aerator & Screenerator—2' x 3'
Marschke Swing Frame Grinder—7½ H.P.—3 speeds

BALCHER MACHINERY COMPANY
1884 S. COMPTON ROAD
CLEVELAND HEIGHTS 18, OHIO
TELEPHONE: FAIRMOUNT 1-1186

FOR SALE

The following three (3) phase Arc Furnace equipment: one (1) G.E. 400 Amp. 15000 Volt. Oil Circuit Breaker; one (1) Westinghouse Balance Beam Current Regulator Panel; one (1) Westinghouse Control Panel; one (1) 350 KVA. Pittsburgh. Transformer. Address: Box 830, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Continuous Despatch baking oven. Sectioned for loading and unloading, preheat, heating and cooling. 93'8" L, 13'W, 14' H. Link Belt conveyor; gas-fired externally, recirculating. All section have non-thru metal panels, rock wool insulated. Address: ARCOS CORPORATION, 1500 S. 50th STREET, PHILADELPHIA 43, PA., T. McGOVERN.

FOR SALE

Gardner-Denver stationary air compressor, 125 lb. air pressure. Model WBE 3005, serial #82625. Vertical three stage—7 & 5 ¾ x 5 three cylinder—water cooled—40 horse motor 220 or 440 direct drive. Guaranteed like new. Address: Box 717, The FOUNDRY, Cleveland 13, Ohio.

How do your employees WANT to invest their savings?

People are *more than twice as inclined* to invest their extra money in Savings Bonds as in any other form of savings or investment, according to the 1949 Survey of Consumer Finances*. That's adequate proof that your employees want your company to have the Payroll Savings Plan, by which they get the convenience of obtaining bonds regularly and "automatically"— delivered with their pay checks.

More than 20,000 companies operate Payroll Savings. The managements of these companies know it's "good relations" to provide this convenience. They can *see* the company-benefits in improved worker efficiency and stability. They know, too, that it's "good business"—because Payroll Savings boosts Bond sales, and Bond sales create a huge backlog of purchasing power that's "business insurance" for the years ahead.

Of course every Bond buyer builds financial independence because his Bonds at maturity will return $4 for every $3 he invests. Holding Bonds, moreover, helps him to realize he's making a profit on his job . . . makes him more resistant to influences which are unfavorable to our economic system.

It's easy to install Payroll Savings

Don't think that installing Payroll Savings is "a lot of work." All you need to do is appoint one of your top executives as Savings Bonds Officer and tell him to get in touch with your State Director, Savings Bonds Division, U. S. Treasury Department. The State Director will provide application cards, promotional material, and as much personal help as necessary. Remember—Payroll Savings *pays!*

**Sponsored by the Board of Governors of the Federal Reserve System and conducted by the University of Michigan. Based on 3,500 interviews in 66 sampling areas throughout the nation.*

The Treasury Department acknowledges with appreciation the publication of this message by

THE FOUNDRY

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council.

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SEALED BURNER

with Flame Failure Protection and Constant Pilot

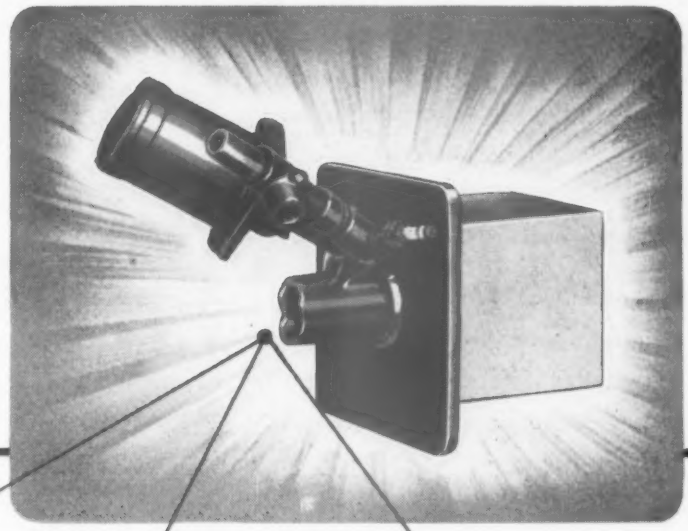
Another McKee Eclipse *Advancement*

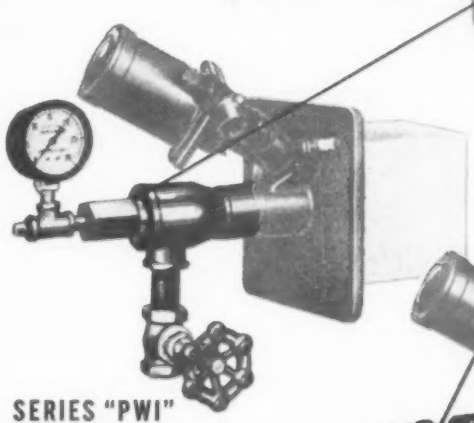
"PW"

McKEE *Series*

PILOTED WALLTITE BURNERS

PATENT APPLIED FOR



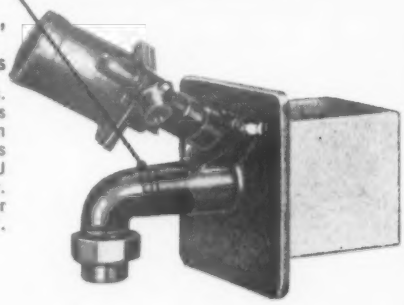


SERIES "PWI"
For High Pressure Gas

Series "PWI" Mckee Piloted Walltite Injector Burners have own mixing device for use with gases at pressures of several pounds. Burner consists of the standard Series "PW" Burner with high pressure air-gas mixer. In 12 sizes, capacities 30,000 to 500,000 BTU per hour. For details write for Bulletin H-63.

SERIES "PW"
For Full Pre-Mix Gas

McKee Piloted Walltite Burners. For use with premixed air-gas mixture supplied by some form of outside mixer. Capacities 13,000 to 1,070,000 BTU per burner using 16 oz. air. For details write for Bulletin H-61.



SERIES "PWP"
For Low Pressure Air and Gas

McKee Piloted Walltite Proportioning Burners—a combination of the Series "PW" Burner and the McKee Low Pressure Proportional Mixer so that each burner is a complete gas-air mixing and burning unit. The use of a Zero Governor with the Burner provides one valve control by air regulation only. In 12 sizes, capacities 11,000 to 900,000 BTU per burner. For details write for Bulletin H-62.

This new addition to the McKee Eclipse Family of Walltite Burners will be welcomed by users of sealed burners requiring instantaneous flame failure protection and constant pilot.

These important essentials are made available by incorporating into the established and proven Walltite Burner design, a McKee Blast Type Constant Burning Pilot, providing instantaneous ignition at all rates of firing—and an electrode for Electronic Flame Failure Equipment, assuring safe operation.

High input efficiency is obtained with Venturi design and better control of Air-Gas Ratio is secured. Dollar-and-cents savings result from placing the burner steel entirely outside the furnace shell; this means longer burner life, as the burner is less exposed to furnace temperatures. Burner and wall mounting are one casting. The entire unit is simple to install and service.

The new Piloted Walltite Burners are particularly suitable in low temperature applications or on furnaces where burners are in a "difficult-to-light" location.

Write for Bulletin on the Series Burner that suits your application.

Eclipse Fuel Engineering Company
725-4 South Main Street, Rockford, Illinois
McKee Eclipse

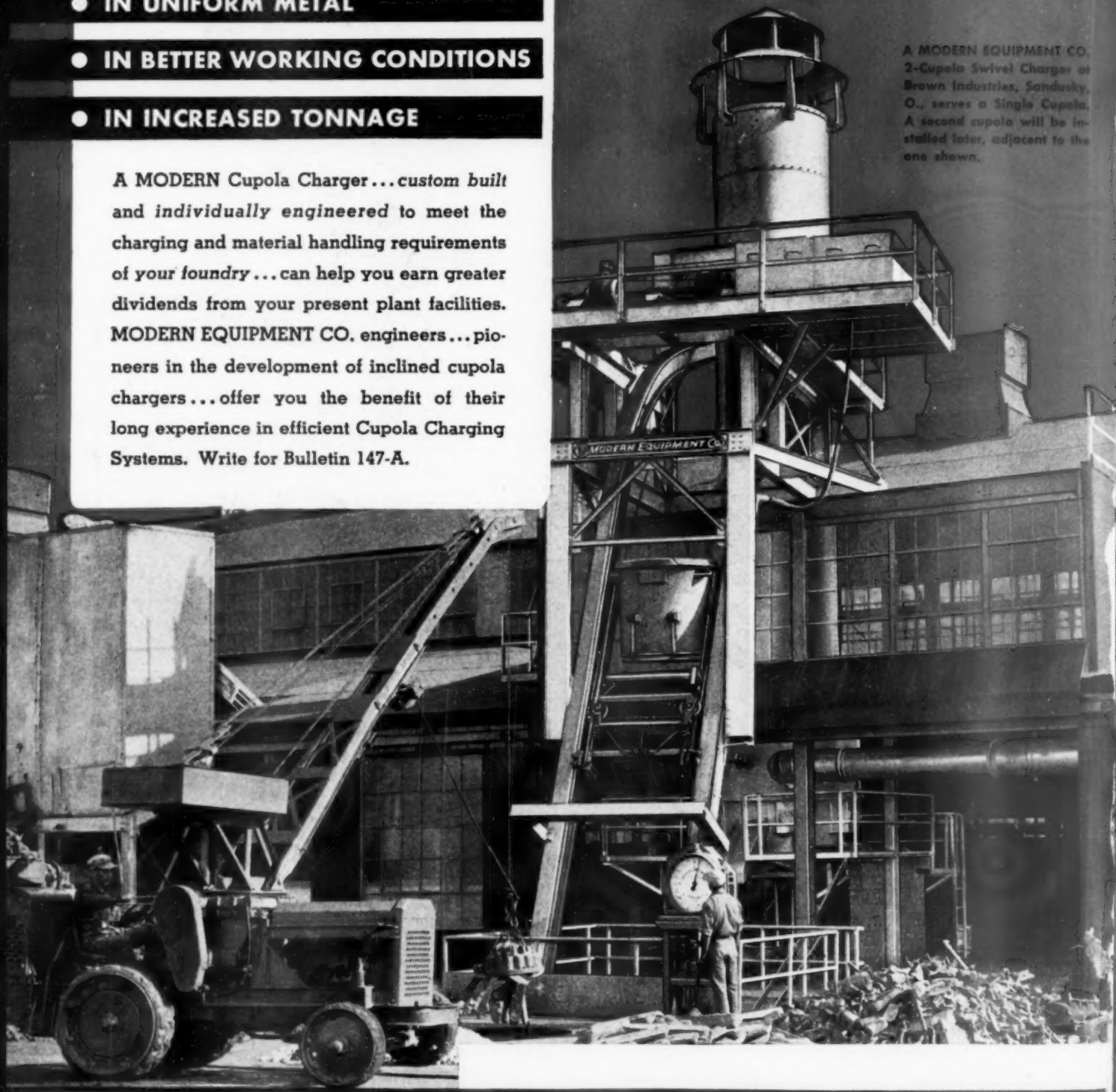
MODERN EQUIPMENT COMPANY

Charging Systems Pay BIG Dividends

- IN LOWER CHARGING COSTS
- IN IMPROVED MELTING
- IN UNIFORM METAL
- IN BETTER WORKING CONDITIONS
- IN INCREASED TONNAGE

A MODERN Cupola Charger ... *custom built* and *individually engineered* to meet the charging and material handling requirements of *your foundry* ... can help you earn greater dividends from your present plant facilities. MODERN EQUIPMENT CO. engineers ... pioneers in the development of inclined cupola chargers ... offer you the benefit of their long experience in efficient Cupola Charging Systems. Write for Bulletin 147-A.

A MODERN EQUIPMENT CO. 2-Cupola Swivel Charger at Brown Industries, Sandusky, O., serves a Single Cupola. A second cupola will be installed later, adjacent to the one shown.



MODERN EQUIPMENT CO.

PORT WASHINGTON, WISCONSIN

CUPOLAS • CUPOLA CHARGERS • LADLES OF ALL TYPES • POURING DEVICES • METAL POURING SYSTEMS • CRANE AND MONORAIL SYSTEMS • ELECTRIC CRANES.

for improved casting finish with no burn-ins, flash or fins . . .

"Performance *plus* what?" you might ask. We hope you do . . . hope you're interested enough to let us demonstrate the many benefits to be derived through your use of Stevens SLICK-SEAL mudding compound.

First, there is the convenience of using a compound that remains plastic and workable during an entire 8-hour shift. Yet, light applications of SLICK-SEAL air-dry in from 1 to 2 hours; heavy applications take only 4 to 5 hours.

Coremakers have a special word to describe its application qualities on pasted joints, core crevices and rough core surfaces. "Slick," that's the word and that's the way SLICK-SEAL goes on, smooth and easy with no crumbing, rolling or balling up behind thumb or finger. It leaves the hands clean . . . a most important advantage to women core workers.

Feather edges do not shrink or curl when subjected to oven or metal heat. Flowing metal can't dislodge SLICK-SEAL, cause it to flake, peel or spall off. SLICK-SEAL positively prevents fins or burn-in at pasted joints, because the compound itself is an excellent, high heat resistant facing. Covered by a core wash or not . . . *it improves metal finish.*

ORDER SLICK-SEAL TODAY . . . at our risk!
If you do not find it to be superior to the compound you're now using, return any unused portion for complete credit or your money back. You must be satisfied!

Visit the Stevens Booth, 1207 AFS Foundry Show at Cleveland, May 8th to 12th.

use Stevens

SLICK-SEAL MUDDING COMPOUND

you'll get performance plus!

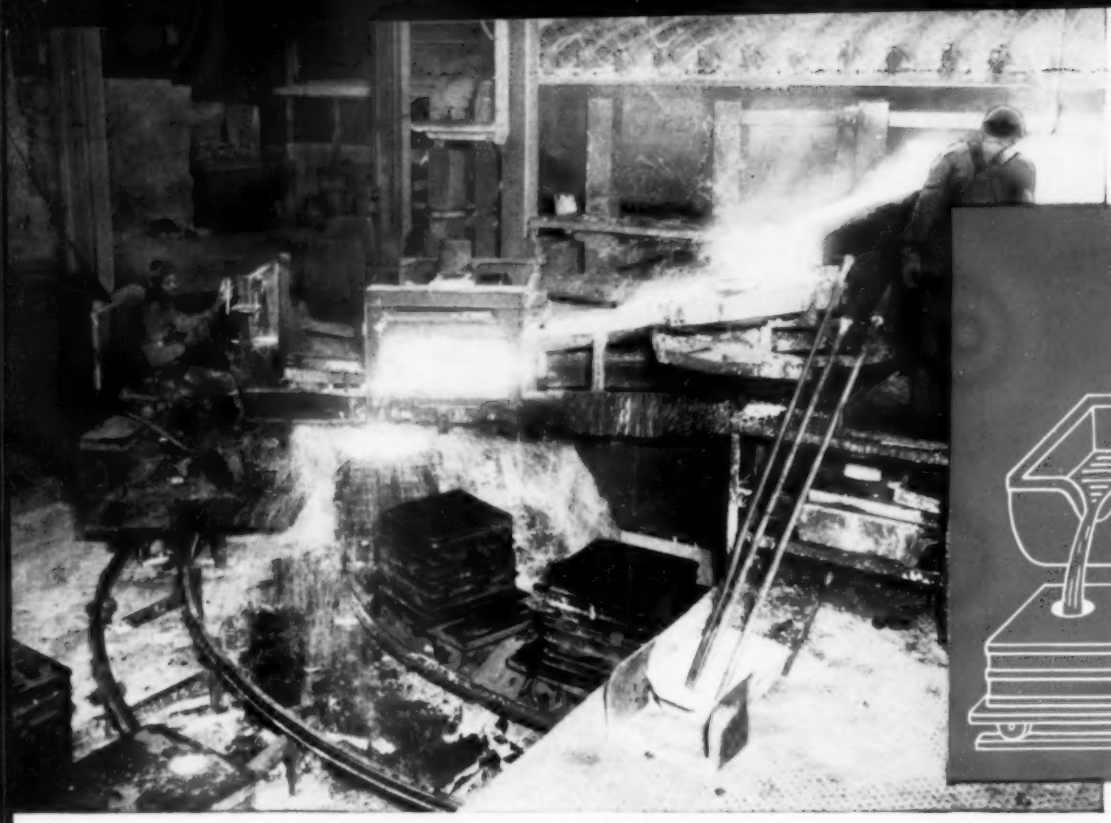
SINCE 1882 — STEVENS INCORPORATED FREDERICK B. — EVERYTHING FOR A FOUNDRY — DETROIT 16 MICHIGAN

LEADING MANUFACTURERS AND DISTRIBUTORS OF FOUNDRY FACINGS, EQUIPMENT AND SUPPLIES

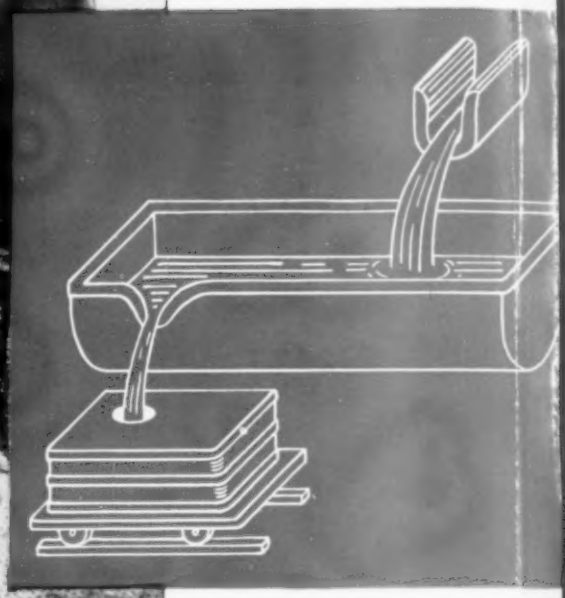
FREDERIC B. Stevens INCORPORATED
DETROIT 16, MICHIGAN

Branches • Sales Offices • BUFFALO • NEW HAVEN • INDIANAPOLIS • CLEVELAND
Representatives in Principal Cities
FREDERIC B. STEVENS OF CANADA, LTD. WINDSOR, TORONTO, ONTARIO

FOUNDRY FACINGS EQUIPMENT AND SUPPLIES DIVISION



At left: Link-Belt pouring machine handling metal from air furnace to continuous mold conveyor.



Mechanized Pouring and Automatic Shakeout by LINK-BELT further increases foundry production efficiency

Another example of the use of newly developed Link-Belt equipment for increasing the efficiency of foundry operations is afforded by a prominent malleable castings producer.

The Link-Belt pouring machine is pivoted from the air furnace and operated by synchronizing its movement with the continuous car type mold conveyor through a circular arc of about 60°. A wide range of flask sizes, molds and castings weights can be accommodated. No manual lifting or pushing of ladles. Control of hot metal accurately maintained.

The automatic shakeout for tight flasks is synchronized with and operated from the continuous car conveyor. Shakeout machine picks up flask from each car, moves over to a discharge opening and vibrates the flask so that sand and castings drop out on conveyor below, then travels forward and returns empty flask to conveyor car—repeating this cycle for each flask *while mold conveyor is in continuous operation.* Handles a variety of flask sizes, reduces operating hazards, minimizes dust and production delays.

Let us give you further details on these new developments.

Above: Automatic shakeout for tight flask molds.

LINK-BELT COMPANY

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